THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Apart from Southern pig iron, which continues to attract more than the usual amount of attention, the iron market of the week presents little of moment. Some Southern furnaces, after getting into concededly better shape in the preceding two weeks, with $9.25 generally accepted as minimum for No. 2, have done business in the past week at $9, a number of round lots being sold at this price. Pipe works have been among the buyers and one deal of 25,000 tons of pipe iron is reported to have been put through, though this is not positively confirmed. In Central and Western markets it is believed that 40,000 to 50,000 tons of Southern iron was taken in the week's buying. Again the assurance is out that $9.25 is minimum and that $9.50 is obtained on a good portion of the small lot business, though naturally, in view of the recent sharp competition between large interests, there is some skepticism toward all talk of minimums, the Southern furnace problem being much of a law to itself. That so much iron has been taken up for consumption in the next 60 days is an encouraging commentary on the scale of consumption. While there is some lengthening of the period covered by current buying it is rare that iron is taken for wants beyond February. There has been considerable pressure on lower grades of Southen irons but this is thought to be relieved by the sales of the week. Coal miners' wages in the Birmingham district are now down to the scale minimum, showing how swiftly the readjustment in the market has come. Wage reductions at Northern furnaces, amounting to 8 to 10 percent, are being announced. The steel corporation initiative at Youngstown, O., will be followed by other furnaces in the Valley and Pittsburg districts. These cuts are not being resisted, the conditions seemingly being appreciated by the men. The drastic character of the curtailment made by blast furnaces between the Alleghenies and the Chicago district appears in the official statement that out of 157 furnaces using Lake Superior ores 91 were idle on Dec. 1, or 57 percent of a daily capacity of 37,000 tons. This means that 21,000 tons a day or 7,600,000 tons a year has been cut off from a yearly capacity of about 14,000,000 tons. Still there is no perceptible effect on the market for Northern foundry iron, which remains from $1 to $2 a ton above Southern in the Central West and $2 to $3 a ton higher in the East. Some better demand has appeared for Northern grades, and the prevention of stock accumulations is expected to hold substantially the present level for the Northern product. In the billet and finished steel markets interest centers in the meetings of manufacturers at New York next week. The questions of the continuance of the various price agreements for another year and of the price basis for the early portion of the new year are to be decided. The movement in the steel billet and finished material markets meantime is naturally narrow. The wage and other readjustments coming at the beginning of the year are absorbing attention. Some rail business is being done, a 10,000-ton order being taken by Pittsburg mills in the week, while considerable export business, particularly for Canada, is being figured on. In most lines domestic business is lamentably light. Chicago reports contracts for 4,000 tons of structural steel for two buildings, and the American Bridge Co.'s total of 40,000 tons closed for November is considered fair. Steel bars are more active than in some weeks, but bar iron still lags. Wrought pipe, merchant sizes in particular, is lower and there are further concessions in wire and wire products.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
439 PARK BUILDING, Dec. 9.

Interest in the iron and steel market now centers on the meetings of the steel manufacturers to be held in New York next week. That of the billet manufacturers has been called for Wednesday, Dec. 16, and the meetings of the steel bar, plate, structural and rail manufacturers will be held afterward. It is already anticipated that the meetings will consume the greater part of the week, and upon their action largely depends the course of the steel trade after the first of the year. A few of the steel manufacturers are in favor of still further reducing the price of billets, but the majority believe that the present schedule should be left alone, which would preclude further changes in the finished lines and thus prevent another unsettled condition in the trade. None of the independent steel manufacturers have as yet expressed themselves as dissatisfied with the last agreement, and the indications are that nearly all now members of the association will consent to become parties to the agreement extending through the new year. No changes in plates or structural material are anticipated and the course of the steel bar market depends entirely upon the action that will be taken on billets.

A better feeling generally prevails in the iron and steel trade, steel producers reporting more inquiries, while foundries are buying more freely than for some time. Within the past three weeks the transactions in Bessemer iron will easily aggregate 8,000 tons, while a sale of one lot of 6,000 tons and another of 4,000 tons of heavy melting scrap, for open-hearth plants have been made at prices ranging from $11 to $11.25, gross tons, Pittsburg. The demand for steel bars, as well as tin plate and sheets, is improving, while the wire and wire nail trade continues to hold up as well as might be expected after a season of as heavy buying as that just closed. The pipe trade, which help up well all summer and fall, has declined considerably, especially for merchant sizes, and a revision of the present discounts by the largest producer is expected almost daily.

Coke prices continue on the downward trend, one sale of furnace coke for delivery the first six months next year, calling for about 35 cars daily, having been made at $1.50 at the ovens. Not many of the coke producers are willing to meet this price on next year's business, and are holding for $1.60 to $1.65, but it is doubtful if contracts for the finest grades of Connellsville furnace coke can be placed

by consumers on this basis. While $2.25 to $2.40 and as high as $2.65 for the finer grades of foundry coke have been the prevailing quotations, we note the sale of a considerable tonnage of good Connellsville foundry coke for shipment during the next two or three weeks at $2.15. On contracts for the first six months of next year as low as $2 has been done on foundry coke, below 1.00 percent in sulphur, but it is not believed grades running from .65 to .85 could be had at this price, although not much of an advance will be asked. The committee appointed by the coke operators is still at work, but as yet has not formulated a plan by which it is certain that output could be further curtailed and prices maintained.

During the past few days, independent coke operators in the Klondike coke region have posted notices of reductions in wages averaging about 10 percent, and the initiative thus taken will be followed by the H. C. Frick Coke Co. and other operators in the upper Connellsville field the first of the year. In the Mahoning and Shenango Valleys and in the Pittsburg district the action of the Carnegie Steel Co. in reducing the wages of the blast furnace workers at Youngstown, O., from 8 to 10 percent will be followed as soon as the various stacks are placed in operation. Yesterday the special convention of the Amalgamated Association's sheet workers assembled for the purpose of removing the limit of output in all union sheet mills, and the manufacturers are urging a reduction in wages of 20 percent. It is a question whether this can be done, as the convention was called only for the purpose of acting on the output limit.

Blast furnace returns received by the committee appointed by the operators of the Central West showed on Dec. 1 only 65 furnaces in blast out of a total of 156 in the Central West and West. Ninety-one were idle, and this number will no doubt be still further increased during the present month. The total capacity represented by these furnaces amounts to 14,000,000 tons per year and 57 percent of this capacity was idle on the first of the month. This indicates a curtailment of about 20,000 tons a day, or 600,000 tons a month.

Pig Iron.—The demand for foundry iron shows a still further slight improvement, and while buying is limited to small lots, orders are more numerous. Northern foundry is held at $14 to $14.50 for No. 2, while Bessemer iron is quoted at prices ranging from $14.50 to $14.85 Pittsburg. Within the past three weeks sales of about 8,000 tons have been reported. Southern iron is firmly held at $9.25 for No. 2, while some operators will not shade $9.50. Southern forge is quoted at $8 as a minimum and Northern forge at $12.75 to $13 Pittsburg, but there is little moving at these prices. The tremendous curtailment of production can have only a beneficial effect on the entire market, and while more stacks are idle at present than at any previous time in the past five years, the accumulation of stocks has been prevented and the market is being placed on a sounder basis. We make the following quotations:

Bessemer, Valley	$13 65 to 13 90
Bessemer, Pittsburg	14 50 to 14 75
No. 1 Foundry	14 75 to 15 00
No. 2 Foundry	14 00 to 14 50
Gray Forge, Pittsburg	12 75 to 13 00
Chilled Basic, Valley	13 25 to 13 50
Chilled Basic, Pittsburg	14 10 to 14 35

Steel.—The demand for billets, sheet and tin bars and rods continues limited and there is little buying. Consumers generally are waiting to learn of the outcome of the meeting to be held in New York next week before covering future requirements. Agreement quotations are unchanged as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon $1 advance and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are quoted at $31 Pittsburg, but there is little buying, and no doubt a large order could be placed at $30.50.

Ferro-Manganese.—The ferro market is badly demoralized and less than carload lots are now being quoted at $46 per ton for 80 percent, delivered at buyer's mill, at any point east of the Mississippi. For more than six months the official prices have not been adhered to, but they have not been formally changed from $50 to $52.

Spelter.—The market continue quiet and weak. Prime Western grades are held at 4.63½c to 4.65c Pittsburg.

Muck Bar.—There is little demand for muck iron and it is held at $25 Pittsburg. It is believed that this could be shaded $1 on a desirable tonnage.

Skelp.—Small lots are moving, one sale of iron skelp amounting to 250 tons having been made. Grooved iron is held at 1.42½c to 1.45c, while sheared is held at 1.47½c to 1.50c. Steel skelp is held at 1.40c to 1.45c.

Rails and Track Material.—The Edgar Thomson plant of the Carnegie Steel Co. is making preparations to shut down over the holidays for the installation of a new engine and repairs. Little new domestic business is being placed, but Canadian and other export business is being sought. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 and 20 pounds, $26.50 to $27; 25 to 40 pounds, $25 to $25.50. Track material: Spikes, 1.95c to 2c; track bolts, square nuts, 2.25c to 2.30c; hexagon nuts, 2.40c to 2.45c; fish plates, 1.60c on orders accompanying large rail contracts, otherwise 1.80c to 1.85c is asked.

Plates.—A meeting of the plate manufacturers will be held in New York next week, but unless billet prices are materially reduced, there will probably be no change in the present schedule. We make the following quotations: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plate 3-16-inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Bars.—The demand for steel bars is improving, the number of orders constantly increasing. If billet prices are reduced next week, there may be a slight reduction in bars, but if no change is made, present prices will be reaffirmed. We make the following quotations: Bessemer steel bars, 1.30c; open-hearth, 1.40c; plow beams and cultivator beams, 1.30c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.40c; common bar iron, 1.30c to 1.35c Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Hoops are quoted at 1.65c, full extras, in 250-ton lots and over, and 1.75c in less than 250-ton lots. Bands are quoted at 1.30c and take the bar extras.

Structural Material.—At a meeting of the structural steel manufacturers to be held next week, prevailing quotations will no doubt be reaffirmed and the organization continued for another year. Little new business is being placed, although considerable is being figured on. Quotations remain as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—While no concessions are being made on black and galvanized sheets to 500-bundle lot buyers, the few very large buyers of the country are reported to be securing concessions of from $1 to $2 per ton from the quottions we make below, which are for black sheets in 500-bundle lots and over: No. 28, 2.35c to 2.40c; No. 27, 2.25c to 2.30c; No. 26, 2.15c to 2.20c; Nos. 22 and 24, 2.05c to 2.10c; No. 18 and 20, 2c to 2.05c; Nos. 14 and 16, 1.85c to 1.90c; Nos. 10 and 12, 1.75c to 1.80c. Galvanized, Nos. 10 to 17, 2.40c to 2.45c; Nos. 17 to 22, 2.60c to 2.65c; Nos. 22 to 25, 2.80c to 2.85c; Nos. 25 and 26, 3c to 3.05c; No. 27, 3.20c to 3.25c; No. 28, 3.40c to 3.45c; No. 29, 3.80c to 3.85c; No. 30, 4.20c to 4.25c.

Pipes and Tubes.—A revision of present quotations is

looked for by the trade almost any day. Independent pipe manufacturers are holding iron pipe on the same basis as steel at the present time. Little new business is being placed in the merchant sizes and not much large pipe is being figured on. We quote carload lots to consumers, f. o. b. Pittsburg, plus freight according to Tube Rate Book to destination:

MERCHANT PIPE.

	Steel Pipe.		Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	69	59	66	56
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Extra Strong Plain End				
¼ to 8 inch	67	57	63	53
Threads only	66	56	62	52
Threads and Couplings	65	55	61	51
Double Extra Strong Plain End				
½ to 8 inch	59	49	55	45
Threads only	58	48	54	44
Threads and Couplings	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent.
1 to 1¼ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	58½

Iron.

	Percent.
1 to 1¼ inches	36½
2¼ to 5 inches	45½
1¾ to 2¼ and 6 to 13 inches	38½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3½ to 4 inches	60
4¼ to 12½ inches	63

Wire and Wire Nails.—Concessions on wire products and nails from last official quotations are from $2 to $3 per ton. The amount of new business that is being placed is good considering the season of the year. A meeting of the cut nail manufacturers will be held within a few days for the purpose of considering present prices. We revise quotations as follows: Wire nails, carload lots, to jobbers, f. o. b. cars Pittsburg, $1.85 to $1.90; plain wire, carload lots, $1.75 to $1.80; barb wire, carload lots, $2.15 to $2.20; staples, carload lots, $2.05 to $2.10. Galvanizing, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $1.90, and less than carload lots, $1.95, f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2 in carload lots and $2.05 in less than carload lots. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—Demand for shafting and the finer grades of steel is not very heavy, although some of the large shafting manufacturers expect a good demand from the South after the first of the year. We make the following quotations: Turned cold rolled and ground shafting, 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.70c to 1.80c; spring steel, 2.15c to 2.20c; toe calk, 2.15c to 2.20c. Tool steel is quoted 7 cents and upwards, according to the grade.

Old Material.—Within the past ten days open-hearth plants have purchased heavy melting stock aggregating about 10,000 tons at prices ranging from $11 to $11.25 Pittsburg. Cast scrap is in better demand, although prices continue low.

Coke.—Furnace coke for the first half of 1904 will be placed at prices rang from $1.50 to $1.65, while foundry will be placed at prices ranging from $2 to $2.15. A sale of furnace coke into next year at $1.50 has already been made, while foundry coke for immediate shipment has been sold during the week at $2.15. On the other hand some operators in the Connellsville region producing a particularly low sulphur coke are securing as high as $2.40 to $2.50 for immediate shipment. For the week ending Saturday, Nov. 28, 11,178 ovens in the upper Connellsville region were out of blast and 1,282 in the lower region. The upper region produced 120,140 tons and the lower 43,015 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, Dec. 8.

In some of the lighter forms of finished material there is an improved demand. Billets, plates, rails, structural steel and other heavy material are not so animated, this being attributed largely to the high prices asked. Pig iron is firmer and there is a better demand. It is considered doubtful if the leading producers would today consider an order at less than $9.25 Birmingham for No. 2 foundry, although a large tonnage of Southern iron was moved last week on the basis of $9. The market grew much stronger toward the end of the week, caused by the withdrawal of several furnaces in the South that expect to get better prices later on. No furnace will sell beyond the first quarter of 1904 at present quotations, and this fact, coupled with the statement that all prices are made subject to change without notice, is taken as evidence by many of an intention to ask higher prices in the near future. That there is a decided improvement both in the volume of transactions and tone of the market is unquestioned, the inquiry pending at the present time being between 40,000 to 50,000 tons.

Specifications on steel bars have been heavy during the week and new business is of fair proportions. Iron bars, however, maintain their low level, prices showing a declining tendency. Black sheets are offered at 2.51½c for No. 28 gauge and galvanized at 75, 10 and 7½ percent discount at mill. There is good demand for both these materials, the leading interest taking the bulk of the business. Billets are quoted as low as $21 Chicago by producers not in the agreement, though booking little or no business in this territory. Contracts for about 4,000 tons of structural steel have been closed during the week, and several estimates embracing a large tonnage are being figured on. Coke is quiet and the Connellsville product is being offered at from $2.40 to $2.65 at the ovens. Southern brands are quoted from $4.75 to $5.25 Chicago.

The plant of the Inland Steel Co., at Indiana Harbor, Ind., will be running full in all departments before the end of the week, the fires in the furnaces having been lighted Monday. This plant has been shut down for four weeks, in part because of lack of orders and also because the men refused a reduction in their wages.

Pig Iron.—A heavy tonnage of iron was bought last week, and the movement was brisk from Monday to Saturday, the market growing considerably stronger toward the end of the week. The purchasers included foundries in all sections of the territory tributary to this city, and the contracts closed ranged from 100 to 3,000 tons. It is the belief of some sellers that it was the best week in point of actual buying in several months and the tonnage closed would fall not far short of 50,000 tons, with inquiry for considerable amounts pending. Most of this iron was closed on the basis of $9.25 Birmingham for No. 2, though a large tonnage was booked at $9. The market is so much improved, however, that the latter price has practically been withdrawn by a number of producers, but is still being openly made by one or two. Sellers of pig iron have also taken a very firm position in the matter of deliveries on contracts closed at current quotations. Three months is the longest period allowed; for shipments extending beyond this date furnaces insist on a higher price, generally 25 to 50 cents a ton above the market. Even on inquiries for deliveries within the stipulated period, the quotation of $9.25 is subject to immediate acceptance. Most of the iron sold has been Nos. 1 and 2 foundry and soft. We learn that the basic iron sold two weeks ago to a local furnace, amounting to 3,000 tons, was closed on the basis of $9 Birmingham. Northern irons have improved as a result of the firmer attitude of Southern furnaces and the banking of several local stacks, and makers are maintaining $14 to $14.50 for No. 2. Our quotations are as follows:

Lake Superior Charcoal	$16 50 to 17 00
Northern Coke Foundry No. 1	14 50 to 15 00
Northern Coke Foundry No. 2	14 00 to 14 50
Northern Coke Foundry No. 3	13 50 to 14 00

Northern Scotch Foundry No. 1	15 00 to 15 50
Ohio Strong Softeners No. 1	16 30 to 17 00
Ohio Strong Softeners No. 2	15 10 to 15 80
Southern Coke Foundry No. 1	13 35 to 13 85
Southern Coke Foundry No. 2	12 85 to 13 35
Southern Coke Foundry No. 3	12 35 to 12 85
Southern Coke Foundry No. 4	11 80 to 12 35
Southern Gray Forge	11 55 to 11 80
Southern Mottled	11 30 to 11 55
Southern Silveries (4% to 6% Silicon)	15 35 to 16 35
Jackson Co. Silveries (6% to 10% Silicon)	17 80 to 19 80
Alabama and Georgia Car Wheel	19 85 to 20 85
Malleable Bessemer	14 75 to 15 25
Basic Iron	13 35 to 14 35

Billets.—Though no sales are reported, independent producers are reported to be offering both Bessemer and open hearth billets at $21 Chicago. Other makers are maintaining the official schedule of $24 in carload lots or greater for rerolling or forging material.

Bars.—Except in the matter of specifications for steel bars, which are heavy, there is no material change to note. Iron bars are weak, with little buying. Hoops and light steel bars are in greater demand than heavier material. We quote iron bars, 1.35c to 1.40c Chicago, carload lots mill shipments, half extras. Steel bars, 1.46½c, Chicago delivery carload lots, mill shipments, with 5c to 10c extra for less than carloads; angles, less than 3 x 3, 1.56½c base half extras; hoops, 1.91½c for carloads, and 1.81½c for lots of 250 tons and greater, with full extras. Jobbers' quotations on carloads and less: Iron, 1.65c to 1.75c, base full extras; steel, 1.60c to 1.70c; small angles, channels and tees, less than 3 x 3, 1.70c to 1.80c; hoops, 2.10c rates, full extras.

Sheets.—While lower prices are recorded than those of a week ago, a better tone is apparent in the market and the demand is of heavier proportions. We quote black sheets, carload lots, mill shipments, No. 27 gauge, 2.46½c to 2.51½c; No. 28 gauge, 2.51½c to 2.56½c; galvanized from mill, 75, 10 and 7½ percent. Store prices are without change, as follows: No. 16, 2.45c; Nos. 18 and 20, 2.55c; Nos. 22 and 24, 2.60c; No. 26, 2.70c; No. 27, 2.80c; No. 28, 2.90c. Galvanized from store, 75 and 7½ percent.

Plates.—A number of small orders have been closed during the week, but the aggregate tonnage is not large. There is no change in prices, and we continue to quote mill shipments, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c; flange steel, 1.85. From store, we quote small lots, tank steel, ¼-inch and heavier, 1.90c to 2c; 3-16, 2c to 2.10c; No. 8, 2.10c to 2.20; No. 10, 2.15c to 2.25c; flange steel, 2.25c, all f. o. b. Chicago warehouse.

Structural Steel.—Contracts for two buildings which will require 4,000 tons of shapes were let this week, and a number of specifications for other work were submitted for estimates. The outlook for business is better than it has been for some time, due in a measure to the reductions in the cost of other building materials as well as in labor. Prices are firm and without change. We quote mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.75c; angles, 3 x 3 and larger, 1.76½c; tees, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 1.90c rates; 18, 20 and 24-inch, 10c extra; tees, 1.95c rates.

Merchant Steel.—There is little new business coming up, though specifications continue undiminished. The tone of the market, however, is strong and the outlook promising. We quote mill prices, Chicago delivery: Spring steel, 2c; sleigh shoe, flat sizes, 1.60c; concave and convex, 1.75c; cutter shoe, 2.25c to 2.30c; smooth finished machinery steel, 1.71½c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.05c. Ordinary grades of tool steel, 6c to 8c; specials, 12c and upwards. Cold rolled shafting in carload lots, 52, and in less than carload lots, 47 percent discount from list.

Merchant Pipe.—There is no diminution to be noted in the week's sales, whether compared to those of the previous month or in the same period of last year. Prices remain unchanged, and we quote to consumers carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ to ¾ inch inclusive	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	70.35	60.35
7 to 12 inches inclusive	67.35	57.35	64.35	54.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—Demand is quiet, sales having fallen off perceptibly in the last two or three weeks. No change in prices is contemplated. We quote carload lots from mill, Chicago delivery, as follows:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ in.	40.85	37.35	53.35
1¾ to 2½ in.	53.35	36.35	40.35
2¾ to 5 in.	59.35	49.35	} Up to 4 inches.
6 to 13 in.	53.85	36.35	} 48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ in.	40	35	37.50
1¾ to 2½ in.	50	32.50	35
2¾ to 5 in.	57.50	42.50	} Up to 4 inches.
6 to 13 in.	50	32.50	} 45

Cast Iron Pipe.—The unseasonable weather for pipe laying has shut off practically all demand. We quote carload lots, f. o. b. Chicago: 4-inch pipe, $28; 6-inch and upwards, $27; gas pipe, $1 a ton higher.

Rails and Track Supplies.—Light rails are in good demand and a considerable tonnage has been taken during the week. Inquiry for heavy rails continues heavy though no sales are reported. We quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than car lots, $32; second quality rails, $27; 25-pound rails, $28 to $30; 12-pound rails, $30 to $32, with regular differentials for intermediate sizes. Track supplies, mill shipments, angle bars, 1.80c to 1.90c; spikes, first quality, 1.95c to 2c (out of store, 2.10c to 2.20c rates); second quality, 1.65c to 1.75c; track bolts, 3½ x ¾, with square nuts, 2.70c to 2.80c per 100 pounds; (from store 2.90c) with hexagon nuts, 2.85c to 2.95c (from store 3.05c), with usual differentials for other sizes.

Wire and Wire nails.—Manufacturers report that while there is good demand, buying has fallen off to some extent, owing to heavy falls of snow and severe frosts in the Western States. No change in prices has been made, though the leading interest is meeting the cuts made by independent producers. We quote prices to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.15; less than carload lots, $2.20. Cut nails, steel, carload lots, $2.05; less than carload lots, $2.10. Plain wire, $2.05 carloads, and $2.15 in smaller lots; galvanized plain wire, carloads, $2.35; smaller lots, $2.40. Painted barb wire, carloads, $2.45; less than carloads, $2.50; galvanized, carloads, $2.75; less than carloads, $2.80; staples, carloads, $2.30; smaller lots, $2.35; galvanized, carloads, $2.70; smaller lots, $2.75. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or De Kalb with actual freight allowed not exceeding 50 cents per 100 pounds.

Coke.—Orders are of only moderate proportions, buyers limiting their purchases in a large measure to tonnages of sufficient proportions to cover their wants for a few weeks ahead. A lot of 4,000 tons of Connellsville furnace coke was closed last week at $1.70 at the ovens, which is probably the largest sale of the week. Standard 72-hour Frick coke is held firm in this market at $2.65 at the ovens, though other grades of Connellsville coke can be bought as low as $2.35. New River and Pocahontas range from $4.75 to $5.15 Chicago.

Old Material.—Though there is little demand, dealers report that the market has improved in tone. Railroads in the East are withholding their material from the market on account of the low prices, though western producers of scrap iron show no hesitancy in selling at the best prices they can obtain. The following quotations are not official; they can in several instances be shaded 25 cents to 50 cents a ton. We quote dealers' selling prices, gross tons, as follows:

Old iron rails	$14 00 to 14 50
Old steel rails (mixed lengths)	9 00 to 9 50
Old steel rails (long lengths)	10 50 to 11 00
Relaying rails	23 00 to 24 00
Old wheels	11 50 to 12 00
Heavy melting steel	9 00 to 9 50
Mixed country steel	7 00 to 7 50

The following are selling prices for net tons:

No. 1 R. R. wrought	$10 00 to 10 50
No. 2 R. R. wrought	8 50 to 9 00
Shafting	11 00 to 11 50
Dealers' forge No. 1	9 00 to 9 50
No. 1 busheling and wrought pipe	7 50 to 8 00
No. 1 cast	10 50 to 11 00
Heavy cast (300 pounds and over)	8 00 to 8 50
Agricultural malleable	9 00 to 9 50
Iron axles	14 00 to 14 50
Steel axles	11 50 to 12 00
No. 1 boilers, cut	7 50 to 8 00
Cast borings	3 00 to 3 50
Mixed borings, etc.	3 00 to 3 50
Wrought turnings	6 00 to 6 50
Machine shop turnings	6 00 to 6 50
Iron axle turnings	6 50 to 7 00
Steel axle turnings	6 00 to 6 50
Stove plate and light cast scrap	8 50 to 9 00
Old iron splice bars	10 50 to 11 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Dec. 8.

Reports of shipments of ore for November will be compiled with those of the first two weeks in December, making the record of the season complete, as no more ore will be loaded on vessels after this week. The indications are that the total for the season will be slightly above 23,500,000, a loss of 4,000,000 tons, compared with last year. Shipments at Ashland for the season were 2,823,119 tons, a loss of 730,000 tons; and other ports will show losses.

Pig Iron.—A number of foundries are continuing their efforts to obtain from furnaces quotations on pig iron which will afford some basis for making bids on castings for the Pennsylvania R. R. Co.'s New York tunnel. The time for delivery of the castings was at first placed at five years, but the reluctance of furnaces to contract for iron for so long a period has caused the railroad company to change the time to two years. In spite of this modification, some furnaces have refused to make a contract for a longer period than six months. Others have said that one year would be their limit and it cannot be learned that any furnace has made a definite proposition. In response to inquiries, one furnace company has intimated that it might be willing to sell iron on a two-year contract at a price about $1.50 in advance of present quotations. One large foundry in the Mahoning Valley has offered to furnish a guaranty that, if it obtains a contract for castings from the Pennsylvania R. R., it will take all the iron contracted for. Several Youngstown concerns have received blue prints and are figuring on furnishing from 5,000 to 10,000 tons of the castings. It is probable that within a few days some of the furnaces and foundries will reach an understanding which will enable the latter to submit bids.

Heavy sales of Southern iron were made in Southern Ohio and Indiana the last three days of last week on a basis, for a considerable part of the sales, of $9, Birmingham, for No. 2. The result has been that prices are now somewhat firmer in this locality as well as in the section in which the largest sales were made. The tone of the Southern iron market changes rapidly and frequently. For the first three days of last week, it seemed to be pretty firm at from $9.25 to $9.50 for No. 2. Then the sales followed at $9 and again this week the prices are on the same basis as for the early part of last week, and sales of fair size for delivery up to April are being made. Northern iron is very quiet, but inquiries are more numerous. In some cases, they are for the first quarter and first half, buyers showing a tendency to break away from the hand-to-mouth policy which has ruled for many months. Malleble Bessemer is said to have been sold at $14, Cleveland. For No. 2 the price ranges from $13.50 to $14.00 at the furnace. We quote as follows for Cleveland delivery, save on Northern gray forge, which is at Valley furnace:

Bessemer	$14 50 to 15 00
No. 1 Strong Foundry	14 50 to 15 00
No. 2 Strong Foundry	13 75 to 14 50
No. 3 Foundry	13 25 to 14 00
No. 2 Southern	12 85 to 13 25
Gray Forge, Valley furnace	12 75 to 13 00
Gray Forge, Southern	11 85 to 12 00
Lake Superior charcoal	16 50 to 17 00

Finished Material.—Twenty companies have obtained blue prints and are figuring on bidding for the structural material for the Rockefeller building. A fair tonnage of steel bars at 1.30c for Bessemer and 1.40c for open hearth, Pittsburg, has been sold this week, one contract being for the year ending Jan. 1, 1905. Bar iron is dull, the usual price being 1.30c at the mill, but Youngstown mills have been compelled in some cases to shade that price to meet the competition of local mills at certain points. Independent producers of sheets are more prominent, cutting in some cases $2 below the prices of the principal producer. We quote mill sales of black sheets as follows: No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.30c; No. 28, 2.40c. Galvanized, 75, 10 and 7 off. Out of stock, prices are as follows: No. 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.10c. Galvanized, out of stock, No. 16, 75 and 7½ off; No. 18-20, 75 and 10 off; No. 22-28, 75, 10 and 2½ off.

Old Material.—Reports of heavy purchases of heavy steel in Pittsburg and the presence of several buyers from that city in Cleveland have aroused a languid condition to some extent; the prices offered by Pittsburg agents were so low, being $9.30 to $9.40, Cleveland, that they succeeded in getting little, if any, steel in this market. Mill scrap is lower, but inquiries are more numerous. We quote the following gross tons, Cleveland:

Old iron rails	$15 00 to 16 00
Old steel rails (over 6 feet)	10 00 to 11 00
Old steel rails (6 feet and under)	11 00 to 12 00
Old car wheels	13 00 to 14 00
Steel boiler plates	9 00 to 10 00
Malleable iron (railroad)	11 00 to 12 00
Malleable iron (agricultural)	9 00 to 10 00
Heavy steel	9 00 to 10 00

We quote the following net tons:

No. 1 R. R. wrought	$11 50 to 12 00
Mill scrap	9 00 to 10 00
No. 1 machine cast scrap	10 00 to 11 00
Iron axles	14 00 to 15 00
Axle turnings	9 00 to 10 00
Wrought turnings (free from cast)	6 00 to 7 00
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	6 00 to 7 00
Pipes and flues (clean)	8 00 to 9 00
Tank iron	8 00 to 9 00
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 7 00
Stove plate	8 50 to 9 00
Steel axles	13 00 to 14 00
Cast borings	2 50 to 3 00

CINCINNATI.

Dec. 8.

The coke market continues easy and prices for Connellsville coke are quoted as low as $2.15 f. o. b. ovens. The ruling quotation is $2.25 f. o. b. ovens for standard brands. There is not much demand and the trade is quiet.

Pig Iron.—The developments of the week have been calculated to unsettle the market and prices for No. 2 foundry have been quoted at $9 Birmingham by one of the leading furnace interests. This quotation it is stated is withdrawn at the close of the market week and the same interest that quoted the price is now said to be asking $9.50 Birmingham. The $9 price was met by one other furnace company and this company is now refusing to sell at less than $9.25 Birmingham. At this writing, therefore, the market is again on the basis of $9.25 to $9.50 Birmingham, but the record of the week stands as a menace to the confidence that was so firmly established at the close a week ago. The tonnage sold in the past week was large and included some round lots. Several of these transactions covered 5,000 tons and over. One large transaction believed to be in the neighborhood of 25,000 tons and involving iron for pipe work is still pending. Most of the large orders went at the $9 price, but there have been a number of sales at $9.25 Birmingham. The action of the one large company in taking on business at $9 has been the only disturbing feature, and while prices are outwardly steadier, the trade is looking now for anything and is not able to make prices with the same confidence that was shown at the close of the preceding week. It may be said, however,

that the closest investigation today fails to produce any evidence that anything lower than $9.25 can be done. There are quite a number of inquiries, and in spite of the disturbing feature mentioned, the turn in the market for the better two weeks ago brought out many of the waiting buyers and there is not much disposition to contest a $9.25 quotation. The sales cover delivery during the first quarter of the year in most instances. It is probable that more Southern iron has been sold in the week under review than in any week since the depression began. Northern iron is weaker but is still below the price for the same grades of Southern in all the territory south of the Lakes. We quote f. o .b. Cincinnati:

Southern Foundry No. 1	$12 50 to 13 00
Southern Foundry No. 2	12 00 to 12 25
Southern Foundry No. 3	11 50 to 11 75
Southern Foundry No. 4	11 25 to 11 50
Southern Foundry No. 1 soft	12 50 to 13 00
Southern Foundry No. 2 soft	12 00 to 12 25
Gray forge	10 75 to 11 25
Northern Foundry No. 1	15 15 to 15 40
Northern Foundry No. 2	14 65 to 15 15
Northern Silvery (8% silicon)	18 65 to 19 15
Southern car wheel iron	19 00 to 19 75

Finished Material.—The market shows but little change and excepting for a further reduction in the bar iron quotation prices remain the same. The demand has not improved and is still confined to conservative quantities. An easy undertone prevails all through the list. For bar iron a quotation of 1.35c Cincinnati is now an open price on car loads. Steel bars are quoted 1.43c base, half extras, with the retail price 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 and 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.80c; No. 16, 2.55c; No. 14, 2.45c; No. 12, 2.35c; No. 10, 2.30c. Tank plates are easy and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.90c to 2c for base sizes.

In merchant pipe there is an easy tone, with independent mills underselling the leading interests, and the large dealers are looking for reduced prices and holding off in their purchases accordingly. Locally there is no quotable change, however, in the figures:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed. Wrought Iron Pipe. Black. Percent.	Guaranteed. Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	63.7	53.7
½ inch	68.7	58.7	65.7	55.7
¾ to 6 inch, inclusive	73.7	63.7	70.7	60.7
7 to 12-inch, inclusive	67.7	57.7	64.7	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2½ inch	54.2	36.7
2¾ to 5 inch	59.7	46.7
6 to 13 inch	54.2	36.7

Old Material.—The market is more active and a steadier tone prevails, though prices are low. We quote:

Old No. 1 railroad wrought, net tons	$10 00 to 10 50
Cast machine and foundry, net tons	11 00 to 11 50
Old iron rails, gross tons	17 00 to 18 00
Old steel rails, gross tons	13 00 to 14 00
Old short lengths, gross tons	12 50 to 13 50
Old iron axles, net tons	14 50 to 15 00
Stove plate, net tons	9 00 to 9 50
Wrought turnings, net tons	11 00 to 11 50
Cast borings, net tons	6 00 to 6 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, No. 150 NASSAU ST., Dec. 8.

Pig Iron.—The first week of December brought more orders than any similar period in months. Southern furnaces continue to do most of the business, with sales ranging from 25 to 500 tons. Southern No. 2 foundry, after being at $9.25 as minimum has again sold as low as $9 and as high as $9.50 Birmingham. One interest has been selling large and small lots at $9.25, for immediate and extended delivery, the latter ending March 1. The reason there are no contracts beyond this date, is that inquiries have stopped there. Another large interest says all contracts for small lots it has closed have been at $9.50, and that it will not sell for $9.25 except for lots of 1,000 tons for immediate delivery. For delivery in 1904, on large and small quantities, beginning with April, it has $11 Birmingham as a tentative price. Several New York newspapers publish a paragraph this morning, stating that the Tennesee Coal, Iron & Railroad Co. yesterday raised the price of No. 2 foundry to $9.75 Birmingham. An official of the company informs your correspondent that the report is without foundation. In Northern irons there has been very little tonnage placed in this vicinity, and many of the orders that have been closed have been to preserve accustomed mixtures. In iron trade circles a more optimistic feeling has developed recently, and hopes are entertained that the new year will bring a substantial revival in business. New York pig iron prices are as follows: Northern No. 1 X, $15.25 to $15.75; No. 2 X, $14.50 to $15.50; No. 2 plain, $14.25 to $15; Southern No. 1 foundry, $13.25 to $13.75; No. 2 foundry, $13 to $13.25; No. 3 foundry, $12.25 to $12.75; No. 4 foundry, $11.75 to $12.25.

Rails.—December has opened with some improvement in business. Some very fair contracts have been closed, with railroads showing a little more disposition to provide for their requirements. Standard sections are $28 at mill.

Finished Iron and Steel.—Outside of a little better feeling prevailing, there is nothing of interest to report in the finished material market. In structural shapes, small lots are being closed so frequently as to make a good tonnage. The American Bridge Co.'s sales for November aggregated about 40,000 tons, which is considered a normal month's business. The company says the outlook for the new year is growing better weekly. In plates a fair activity has prevailed. Sheets are quiet, and jobbers are prepared for dullness until the beginning of the new year. For bar iron there is a moderate demand, with a disposition to shade prices. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.75c to 1.80c; flange, 1.85c to 1.90c; firebox, ordinary, 1.95c to 2c; refined iron bars, 1.40c to 1.45c; soft steel bars, 1.40c to 1.50c; steel sheets, in carloads, New York, No. 28 black, 2.50c to 2.60c; galvanized, 75 and 10 to 75 and 5 off.

PHILADELPHIA.

Dec. 8

Buying of pig iron has been a feature of the market, but it is not clear that consumption has increased. Stocks had become depleted and buying could not be avoided. Improvement of prices for some time to come is not anticipated.

Pig Iron.—There has been a fairly good demand, with little change in prices. In a few transactions 25 cents per ton less than last week was paid. Curtailment of production continues to save the market from demoralization. For No. 2 X foundry $15 for large lots and $15.50 for small lots are the usual quotations. Mill irons are selling more freely at slightly lower prices, about $13 to $13.50 delivered. We quote as follews: No. 2 X foundry, $15 to $15.50; No. 2 plain, $14.25 to $14.75; standard gray forge, $13.75 to $14; ordinary gray forge, $13 to $13.50; Southern No. 2 X rail shipment, $13.50 to $14; Southern No. 2 X on dock, $13 to $13.25.

Steel.—Consumers are awaiting the meeting of the billet pool on the 18th, at which it is expected there will be some action on prices. Demand is very light, more on account of lack of business than of objection to prices.

Finished Material.—The demand is in small lots, no business of importance having developed. There is a fair number of small orders. We quote: Plates, ¼-inch and thicker, 1.75c to 1.80c; beams, angles, channels, 1.75c to 1.80c; small angles, 1.50c to 1.60c; steel bars, 1.45c to 1.50c; refined iron, 1.40c to 1.45c.

Old Material.—There is a little better demand for some grades, but the market is uncertain. We quote: Old steel rails, $11.75 to $12; miscellaneous heavy steel, $11.50 to $12; low phosphorus scrap, $20 to $21; old steel axles, $14 to $15; old iron axles, nominal, $17.50 to $18; old iron rails, nominal, $15.50 to $16; old car wheels, nominal, $13

to $14; choice R. R. No. 1 wrought, $14.50 to $15; country scrap, $13.50 to $14; machinery cast, $12.50 to $13.50; No. 2 light scrap, forge, $11 to $12; No. 2 light scrap, ordinary, $9.50 to $10; axle turnings, $10.50 to $11; wrought turnings, $8.75 to $9.25; wrought turnings, choice heavy, $10 to $10.50; cast borings, $6.50 to $7; stove plate, $10 to $10.50; wrought iron pipe, $10.50 to $11.50.

BIRMINGHAM, ALA.

Dec. 8.

Prices of iron have been marked up at least 25 cents per ton here during the past week, owing to the heavy buying for the first week in December. The principal pipe manufacturers supplied their needs for the next 30 to 60 days at the low figures, as well as some other large users, but it cannot be established that any large quantity of iron has been sold for delivery further ahead than Jan. 31. One interest has sold No. 2 at 9 the past week, but is now reported to be holding for a larger price. It is not thought the Southern iron makers will open their books to any extent for orders calling for delivery over the first half of the year 1904 at a figure lower than $10 Birmingham for No. 2 foundry. The coke for the furnaces will be 10 cents to 15 cents per ton cheaper for the month of December, owing to the fact that the price for mining coal has reached the minimum of 47½ cents provided for in the contract for the year ending June 30, 1904, which specifies that when all grades of iron shall net between $8 and $9 at the furnaces, the price for cutting coal on the Pratt basis small be 47½ cents per ton. Since Aug. 1 the mining price has declined from the maximum, or 57½ cents, to the minimum, 47½ cents, which is a valid illustration of the rapid decline in iron prices prevailing during the past quarter. This decline affects all classes of labor at the mines, except the coke men, and is equivalent to a reduction of about 20 percent in wages. Thus far there has been practically no decline in the labor at the furnaces worth mentioning, though it is reported some companies have given notice that on Jan. 1 there will be an average reduction of 10 percent. Ore miners very generally have received a cut in wages, including both the day labor and those working on a tonnage basis. A strong effort is being made to pull down costs all along the line, as very few iron companies could afford to continue operations with present cost of iron and sell at the prices that have prevailed for several weeks.

We quote as follows, standard grades, f. o. b. cars, Birmingham:

No. 1 Foundry	$ 9 75 to 10 25
No. 1 Soft	9 75 to 10 25
No. 2 Foundry	9 25 to 9 50
No. 2 Soft	9 25 to 9 50
No. 3 Foundry	8 75 to 9 25
No. 4 Foundry	8 25 to 8 50
Gray Forge	8 00 to 8 25
Mottled	7 75 to 8 00
Alabama Carwheel Charcoal Iron, all grades	16 00 to 17 00

There has been considerable inquiry from foundries for iron to be used in the Pennsylvania railroad tunnel, but very few furnaces here seem inclined to make deliveries running over two years such as are wanted by the buyers.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., Dec. 8.

Pig Tin.—During the week the market has been quite strong, principally because of operations in London, and because of a slight increase in the demand from domestic sources. Prices here are about ¼c higher than our last report, with less of a bearish sentiment prevailing. Advances in London make present quotations of both spot and futures about £1½ over those existing a week ago. Closing prices at the Metal Exchange today were as follows: Spot to December, 26⅜c to 26⅝c. London's closings today follow: Spot, £120 2s 6d; futures, £121 7s 6d. Arrivals at Atlantic ports for the month to date amount to 310 tons, with 1,515 tons afloat.

Copper.—Actual market conditions are said to be a little better, but sales consummated do not reflect them. Export orders have been a trifle more numerous, but those emanating from domestic sources continue to be light. Prices are unchanged, and at this writing the official quotations are said to be the basis of sales made in the open market. There have been times during the week when this could not be said, however. In London a decidedly stronger situation has set in, and as a result prices have advanced £1¾ in both spot and futures. Closing prices at the Metal Exchange today were as follows: Lake, 12¼c to 12⅜c; electrolytic, 12⅛c; casting, 12c. London closed today as follows: Spot, £56 12s 6d; futures, £56, 5s. Exports for the month to date amount to 2,097 tons, against 3,756 tons for the same period a week ago.

Lead.—Spot, on account of its scarcity, commands 4¼c, but carload lots, for 30-day shipment, sell at 4⅛c. St. Louis is stronger at 4c to 4.02c. London is slightly lower at £11 1s 3d.

Spelter.—Is weak and lower at 5¼c for spot and 4¾c for December. St. Louis is lower at 4.47½c. London is unchanged at £20 12s 6d.

Antimony.—Cookson's is 7¼c, Hallett's 6¼c, and outside brands 5¾c.

Quicksilver.—Is quoted at $46.50 to $47.50 per flask of 76½ pounds in lots of 100 flasks. London is £8 5s.

Nickel.—Is selling at 40c to 47c for large lots down to a ton, and 50c and 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK Dec 8.

All metals have weakened in price during the week owing to the apathetic attitude of consumers to the market. Buyers are bearing the market down by their small purchases, which policy they have been following for some time in the hope of bringing prices down to a level at which they feel they can contract for several months' requirements. We quote jobbers' prices on Lake copper, carload lots, 12½c; smaller quantities, 12¾c; casting 12⅜c to 12⅝c. Pig tin, carload lots, 26⅝c; lesser lots, 27½c. Pig lead, 4.10c in 50 to 100-ton lots, and 4.35c to 4.50c in smaller quantities; sheet zinc, 6c; antimony, 7¼c to 7¾c for both Cookson's and Hallett's.

Old metals are without change, and we quote dealers' selling prices as follows: Copper wire, $11.50 to $11.75; heavy copper, $11.25 to $11.50; light copper, $10.50 to $10.75; red brass, $10 to $10.25; red brass turnings, $8.50 to $8.75; yellow brass, $7.50 to $7.75; yellow brass turnings, $6.50 to $6.75; lead, $3.90; zinc, $4.25; pewter, $17.

A representative of the United States Steel Corporation has been quoted as saying: "There is no likelihood of a reduction in the price of steel rails to the railroads of the United States. The railroads of this country are perfectly willing to pay $28 per ton for their rails. There is an erroneous idea as to why the Steel Corporation should sell its rails abroad cheaper than in this country. The roads look upon the price of rails somewhat as a bookkeeping charge. The percentage of the Steel Corporation's tonnage in comparison with the total business of the roads is so great that they would rather pay $28 a ton for rails and maintain their rates than enter into a contest for lower priced rails and be forced to accept lower freight rates. If the railroads would name rates which would warrant a price of $22 rails the Steel Corporation would be perfectly willing to make the reduction."

The Buffalo Forge Co., Buffalo, N. Y., has just received an order in its plantation machinery department for a complete outfit of sugar machinery for a plantation in Hayti and has in hand orders for several large vacuum pans for sugar plantations in Mexico. The same company is also executing contracts for the ventilating and heating equipment for the Norfolk & Western R. R. shops at Portsmouth, O., including planing mill, machine shop, erecting shop and oil house, for the new frog and crossing shops of the Ramapo Iron Works at Niagara Falls, N. Y., and for the new finishing shop of the International Harvester Co. at Chicago.

The Uehling-Steinbart Co., Passaic, N. J., manufacturer of pyrometers, has changed its name to the Uehling-Decker Co.

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THE PROBLEM OF THE RIGHT PRICE.

The moderate policy of the large steel interests of the country in the matter of prices, when the heavy demand for steel in 1902 was at its height, was much commented upon at the time. It was then said in connection with some of the commendatory expressions, that such an effort to control the situation and prevent prices from soaring gave warrant for the expectation that the same interests would keep prices from an undue and disastrous reaction when business fell off. There has not been time as yet for the full development of a declining-market policy by the United States Steel Corporation and the interests working with it on certain important products—particularly billets, rails, plates and structural shapes. Thus far there are indications of an effort to maintain fairly steady markets at home, compensating in part for the falling off in domestic consumption by special activity in foreign markets. But just what the policy is to be can scarcely be judged with the end of the year only three weeks ahead and consumers bent on keeping out of inventory every dollar's worth of material that can be postponed.

Producers may well argue, without saying what they will do in the new year, that just now the buying mood cannot be stimulated by price reductions, and as long as some control of conditions is being attempted by means of agreements the example of the late association of Southern furnaces is sufficiently conclusive against a succession of mild reductions. It will be recalled that it was in February that the famous steel rail war of 1897 broke out, and the giving way of the dam of high prices in wire products in 1900 came in early spring with a drop of $20 a ton in a single day. Not until after the turn of the year, when preparations are made for the season of outdoor work, is the real test of prices for finished material likely to come, following such a paralysis of buying as has been seen for weeks.

It will take all the wisdom of all the pools and associations to find the right price—the price at which free buying will be resumed, when once buying becomes again in order. The situation differs much from that in 1900 (which like 1904 was a Presidential year); yet it will be profitable to remember that just before the heavy breaks in prices that marked that year the argument was common that to cut prices would not increase business, and that only demoralization would follow. There is a wide difference, it is true, between 2.25c for steel bars, the price at the opening of 1900, and 1.60c, which was maintained through the unprecedented demand of last year (after most of the contract business had been closed at 1.50c); between 2.25c for beams and channels at the opening of 1900, and 1.60c all through 1902 and 1903; between 2.40c at Pittsburg for tank plates at the beginning of 1900 and the 1.60c basis which the pool has maintained for the past two years. In another very important particular the situation in the iron trade in 1900 differs from that of today. Then consumers abstained from buying because they had overbought in 1899, in their great anxiety to make sure of sufficient material for their needs, and in the scramble they had put up prices on each other. Today stocks in consumers' hands are very low, and outside of the furnace companies, who have high-priced ore on hand, there is not a sign of over-buying. Still, the question with which the manufacturers have now to deal is not the moderate level they have maintained in the past two and a half years, in the face of a demand that made much higher prices easily obtainable, but on what basis, taking conditions as they are, will consumers take hold again with some confidence. In 1900 the reaction was tremendous. In bars there was a fall of $27—or from $45 a net ton in January to $18 as extreme low point in August, though much agricultural business was done at 1c a pound. Structural steel, which was 2.25c in January, was 1.50c in August. Plates fell from 2.40c at Pittsburg in January to 1.05c in July and later the shipbuilding companies shaded 1c on the large contracts they placed.

On two of the products named above, bars and plates, the market found its level without the intervention of any association or pool. High prices had killed off business and it took a very low price to start business again. Today with no such dizzy altitude from which a descent must be made, the basis on which new buying can be stimulated may not require to be so low as was reached in the summer of 1900. But an important question to be decided is whether, under continued shrinkage in demand, the agreements between producers can be preserved in their integrity, even with the help of some agreed reduction from the price level of today.

Accustomed as it is to seeing pools go to pieces under the strain of a declining market, the trade will watch with much interest the working out of the problem the associated manufacturers have before them. But suppose that it should turn out that the moderate policy followed by the large interests in the midst of the boom does not save them from the necessity of duplicating the low dip of 1900 in order to tempt liberal buying. Will it then be concluded that the most effective way in which iron and steel manufacturers may strengthen themselves against the evil day is to get all that the market will give them when times are good? The experience of the Lake Superior ore producers in 1899, of the leading Southern pig iron producers in 1902, and, shall we say, of the steel corporation in 1902 and 1903, contributes some information that is at least suggestive.

THE WORLD'S TRADE IN IRON AND STEEL.

In a recent article in this column it was pointed out that while the per capita consumption of iron in the United States last year was 529 pounds, the consumption of the 1,400,000,000 people outside of the United States, Germany and England was but 24 pounds per capita, and some general remarks were made as to the advantages of the three great iron nations pursuing a peace policy in enlightening the rest of the world as to the use of iron. The New York *Tribune* sees how tempting is the prospect thus presented of opening up new avenues of consumption, but is disposed to question the expediency, from an American standpoint, of being party to any agreement whereby the world should be districted, and each iron nation confine its missionary efforts within its allotted bounds, so that there

should be no duplication and thus waste of effort, and so that there should be an incentive to each nation to push its work, by guaranteeing to it the fruit of its labors.

The *Tribune* bases its argument on two points: that our English and German rivals would not be willing to concede us that share of the outside world's markets to which the *Tribune* thinks we are entitled, and that the United States, if it desires to enter these markets, is too comfortably situated to be moved to make bargains with England and Germany.

The first objection is easily answered when it is pointed out that the *Tribune's* fear that England and Germany may not be willing to accord a proper place to the United States is based mainly on the assumption that that place should be dictated by the relative proportion of iron made by this country, which is placed at "nearly half." The United States has no right to expect any such concession. Our own home market is too extensive and valuable to be legitimately the basis for claims on outside markets. We cannot expect the tonnage going into a market from which England and Germany are shut out to figure as the basis of additional claims. We could justly ask for but a comparatively small share of the world's markets, rather than for "nearly half."

The *Tribune's* second argument is based on a supposition which it does not attempt to prove or even positively assert, its words being "If the United States can produce steel more cheaply than Great Britain or Germany," etc. There is good reason to believe that while we can produce iron and steel, in most forms, as cheaply as the best located works in England and more cheaply than the average there, we cannot produce as cheaply as the Lothringen and Luxemburg districts in Germany (particularly the former) drawing on the Minette ores and employing blast furnace gases for power to the largest extent. And when proximity to fuel and to ports of export is taken into account, Westphalian works have important advantages. The basis of this second argument is therefore gratuitous.

It must be remembered also that present competition in the world's markets is not strictly legitimate, owing to the practices of the German syndicates, by which steel products are frequently exported at a positive loss, which loss falls upon the whole manufacturing body and can therefore be borne. Neither England nor the United States has any desire to imitate this distinctively German practice. The manufacturers of these countries may accept a smaller profit on export business than on home business, in some cases, but in no case is there such an alignment of interests as to clothe a loss with any attractiveness. Such practices belong only to a state of affairs where the building of new works is beyond control, while the disposition of the product is under control, additional production having to be taken care of whether there was economic justification for the increase or not.

A glance at the outside territory under consideration shows how important its division would be to the United States, and what obstacles we should meet as a pure interloper. Taking first territory which has been more or less developed we see the important markets which England has cultivated in Venezuela and other South American countries. If any outside territory belongs to us, certainly it is South America, but England having spent her money in development in that quarter will not lightly see us step in and attempt to wrest a part of the fruits. Should we attempt it, we could only succeed by spending money which England would be saved. In South Africa England has claims which she would not forego without a struggle, and so with her colonies in general.

Germany's position is somewhat different, and in considering it we must take cognizance of an element not heretofore referred to—Russia. Of the odd 1,400,000,000 population which formed the original basis of this discussion, we have 130,000,000 in Russia, 400,000,000 in China and 280,000,000 in India, a total of 810,000,000. Students of international policies have little doubt that Russia's plan, conceived nearly half a century ago, is to bring all this population under its own rule. The quietness with which Russia has been working towards this end furnishes the greatest fear that the ambitious plan may be accomplished, even though it may involve a stupendous war. There is no question that Germany has been playing with Russia in this project, and expects to reap important benefits therefrom. The Germans expect commercial advantage even before any real conquest has been accomplished, through the prodigious work, involving iron and steel, which the Russian Government is steadily prosecuting. But Russia has taken up Germany as a temporary convenience, to be thrown aside when the convenience is no longer needed, and that time will be when the liberal policy of the St. Petersburg Government, in fostering home industries, has created a Russian iron industry which can supply Russian needs. American engineers who have been called upon to aid in this work can testify to the thoroughness and intensity with which it is undertaken. The investigation of American iron works continually being made by splendidly educated Russians has attracted less attention than it deserved because of the lack of ostentation with which it was carried on.

Perhaps the German Emperor has made a mistake in his alliance with Russia, but if this mistake lies in the danger of the German iron trade being thrown out by a Russian iron industry, the mistake affords no consolation to British or American iron makers.

The general situation is too full of possibilities to pass lightly over the advantages offered by an international trade agreement. Our original suggestion was for a peace policy in the world's markets; the general advantage should surely cover injustices which might be done to the iron trade of one country or another. The idea dealt not with the hundreds of thousands of tons now representing international trade, but with tens of millions of tons. The United States can well go ahead capturing such foreign markets as can readily be taken, and without joint action build up a trade running into a few million tons, which shall be all that is needed to supplement our magnificent home market. But in the gap between 24 pounds per capita consumption for 1,400,000,000 people, and 500 pounds per capita consumed by our own people, there is six million tons of iron for every ten pounds increase per capita. The proportionate size of America's share would be of little importance, considering the splendid proportions of the total. That total can, as was said before, be approached but very slowly without the aid of a well arranged plan of education, involving an expense which could not be thought of unless the results were guaranteed to those who do the work.

The Columbus Iron & Steel Co., Columbus, O., has sent to the trade a buckeye souvenir of its "Buckeye" pig iron.

At a meeting of the creditors of the Zanesville Iron Co., Zanesville, O., held Dec. 3, steps were taken toward the reopening of the plant under the management of F. M. Baumgartner, of Pittsburg. The majority of the creditors have consented to the plan. They agree to advance $25,000 and Mr. Baumgartner will advance a like amount.

The Buckeye Malleable Iron & Coupler Co., Columbus, O., has changed its name to the Buckeye Castings Co.

The Pennsylvania Steel Co. has secured a contract for rails to be used in the construction of the electric railway system of the Mexican Traction Co., in and around Mexico City. The president of the enterprise is M. R. McAdoo, 15 Wall street, New York, and a number of other Americans are interested in the company.

Superintendent Floyd Knowles, of the Portsmouth Steel Co., Portsmouth, O., announces that the plant will resume operations as soon as repairs and inventory are completed.

OBITUARY.

George S. King, one of the founders of the Cambria Iron Co., died at his home in Johnstown, Pa., Dec. 8, in his 95th year. He was born at Hagerstown, Md., and early in the thirties went to Johnstown. He located a vein of iron ore on Laurel run and in 1841 the Cambria furnace, which he and three others built, made its first cast. A year late he assisted in the construction of two other charcoal furnaces, also located at Laurel run. A few years later he became an equal owner of these furnaces with Dr. Peter Shoenberger, of Pittsburg, and in 1846 they purchased the Black Lick furnace and erected another at Sharon, Pa. It was in 1852 that Mr. King conceived the idea of starting a rolling mill, the iron that the furnaces produced being hard to work and in many cases unsuitable for marketing. Somewhat against the judgment of Dr. Shoenberger, Mr. King visited Philadelphia and after a year's effort succeeded in organizing the Cambria Iron Co., with a capitalization of $1,000,000. In 1853 ground was broken for the plant that has since grown to such mammoth proportions, and has in fact made Johnstown. The Cambria mills were built expressly to roll rails, the Pennsylvania railroad, passing through Johnstown, having been completed from Pittsburg to Philadelphia the preceding year. The Cambria mills proved to be profitable from the start, but owing to the fact that a number of subscribers failed to take their stock, the company was in financial straits all the time, and the year after the first rail was rolled the mills passed into the hands of Wood, Morrell & Co., under a lease. When this lease expired the plant was again operated by the Cambria Iron Co., which gradually extended its operations and was finally merged in the Cambria Steel Co. By many of his friends of later years Mr. King has been known as "the father of Johnstown."

Capt. Benjamin F. Jennings, a pioneer steel and tin plate manufacturer, died at his home, Allegheny, Pa., on Tuesday, Dec. 1, aged 65 years. For many years he was actively engaged in the promotion of the tin plate industry in this country, having served as treasurer of the American Tin Plate Association for a number of years. He was president and organizer of the West Penn Steel Works, built at Leechburg, Pa., in 1881, which was later removed to Allegheny, Pa., and in 1886 a rolling mill for rolling light plates was built at Leechburg. During the past few years he was not actively engaged in business.

Thomas H. Buckley, manufacturer of night lunch carts and president of the T. H. Buckley Car Mfg. Co., died at his home, Worcester, Mass., Dec. 1, aged 35 years.

George H. Palmer, secretary and treasurer of the Falmer & De Mooys Foundry Co., Cleveland, died Dec. 6, aged 43 years. Mr. Palmer was born in Oskosh, Wis. He had been engaged in the foundry business in Cleveland for 22 years.

Robert Grimes, formerly president of the Elmira Bridge Co., died Dec. 8 at Elmira, N. Y. He built the New York Central viaduct leading from the Harlem river to the tunnel in New York City, the cantilever bridge at Louisville, Ky., and other structures.

Announcement has been made at Boston that the National Steel & Wire Co. has increased its capital stock of $1,500,000 perferred, to $4,000,000, and $1,500,000 common, to $4,000,000, for the purpose of absorbing the Safety Insulated Wire & Cable Co., of Bayonne, N. J. The National company has been furnishing the Safety company with a large portion of its wire requirements. There is outstanding $1,250,000 preferred stock and $1,500,000 common stock of the Safety company, which will be exchanged for National Steel & Wire Co. stock share for share, and in addition, $250,000 of National company preferred stock will be sold at par for cash.

A. M. Crane & Co., Chicago, have been appointed agents in the Western territory in the sale of the steel, iron and brass castings made by the United Engineering & Foundry Co., Pittsburg. This company also manufactures a line of rolling mill and blast furnace equipment in the sale of which Crane & Co. will also represent them in the West.

The Struthers Furnace Co. will blow out its stack at Struthers, O., this week. Extensive repairs will be made.

VISIT FROM ANOTHER ENGLISH COMMISSION.

Following the Moseley commission by several months, there landed at New York on Nov. 24 a delegation of Englishmen representing an important industry, for a three weeks' tour of the United States. There are nine in the party, one of whom is works manager and six in charge of departments in the plant of Willey & Co., Exeter, Eng., the largest manufacturers in England of apparatus for gas plants. Employing about 1,000 men, the Willey works have machine shops, iron and brass foundries and plate and sheet metal departments, the product being not only complete equipment for plants for the production of artificial gas, but also gas fixtures, gas stoves and all the accessories of gas manufacture and gas consumption. Mr. Willey, the head of the concern, returning to Exeter some months ago after a visit to the United States, decided that his foremen should make the trip for the purpose of studying methods in American shops with a view to improving their own.

The party is headed by R. J. Rew, works manager, and includes the following foremen: H. W. Loram, pattern shop; W. J. Jackson, iron foundry; J. Noak, gas engineering; J. Matthews, automatic brass department; J. Salori, brass foundry; F. Woollcott, meter department. There are in the party two other guests of the firm, but not employes. They represent the Exeter trades unions, with which Willey & Co. appear to be on friendly terms—F. Langmead and W. Amery. The commission will visit, in addition to New England points, New York, Philadelphia and Baltimore, the leading cities of the Central West. All have visited Cleveland and Pittsburg; a portion of the party will go to Chicago and Cincinnati. The foundry representatives are paying particular attention to molding machines. The Pratt & Whitney and Brown & Sharpe plants were studied with some detail. In Cleveland among the works visited were those of Bardons & Oliver, Warner & Swasey Co., Cleveland Punch & Shear Works Co., and Wellman-Seaver-Morgan Co.

Mr. Rew, of the commission, who called upon *The Iron Trade Review*, while not desiring to anticipate the report that he will make to his firm, was free to say that whatever doubt may have been entertained before starting, as to the returns from the trip, the first ten days in the United States had amply demonstrated its profitableness.

Improvements under way at the N. & G. Taylor Co.'s plant at Cumberland, Md., include the following: In the open-hearth department, a forty-ton, four-motor traveling crane, span 50 feet, is being installed with a 5-ton auxiliary hoist. The open-hearth building is being extended about 75 feet and continuous ingot-heating furnaces with electrical charging and drawing devices are being installed. Automatic conveyors are being added to facilitate the handling of ingots direct from the open-hearth furnaces to the various departments. Other additions include two 150-h. p. return tubular boilers, new electrical equipment with engine and 125-k. w. Thomson-Ryan generator. Additional equipment in the machine shop includes lathes, planers, shapers, etc., furnished by the American Tool Works Co., of Cincinnati. These improvements give the works increased efficiency both in the producing and finishing departments. In addition to tin plates, the company manufacturers blue annealed sheets of 6 to 16 gauge.

The Long Arm System Co., Cleveland, advises us that it has enough contracts now on its books to keep it in operation to its present maximum capacity for over 20 months, and still new contracts are coming in rapidly, all of which means that it will be forced to expand. Its greatest difficulty has been heretofore to get suitable material officially inspected and passed in the specific way to fill the contracts for its specialties on naval ships. In this particular it is having more success now and is putting more men on in the manufacturing department every week.

Corrigan, McKinney & Co., Cleveland, will blow out their furnace at Charlotte, N. Y., in a few days. A new downcomer will be put in and other improvements will be made.

LAKE SUPERIOR IRON MINES.

The development operations of the Oliver Mining Co., at its Riverton mine, the largest property of the Iron River district, Menominee range, have been attended with good success. There is a fine showing of ore in the various levels. It is surmised that the purpose of so much development work is to determine if the ore lenses are of sufficient extent to pay for the great expense necessary to divert Iron river, which flows over the ore body. This will be a difficult task, but surveys have been made and all data are at hand as a preliminary t changing the course of the channel.

The Oliver Mining Co., in its exploration of the McGillis property, in the Iron River district, has met with considerable success, and is believed to be only a question of time until the option will be closed and a lease taken.

The Caspian mine in the Menominee range is being developed on a large scale by the Verona Mining Co. It required nearly 2 years to sink the shaft to a depth of 300 feet, this being due to the fact that the first 125 feet was sunk through quicksand. Several months have been consumed in opening the ore body that was cut and has proved to be gratifyingly large, and now work on the second level has been started and will be finished in the spring.

For some time past no attempt has been made other than to keep the water down to the twelfth level in the West Vulcan mine at Norway, Menominee range, flooded some weeks ago by the unexpected tapping of a mysterious flow of water in the fifteenth level. In the meantime the work of installing larger pumping capacity is being pushed, and a vigorous effort will be made to unwater the mine.

A good record has been made this season at the Breitung Mining Co.'s Mary Charlotte property at Negaunee, Marquette range. The mine is less than a year old. Since last February a well equipped mining plant has been installed, a shaft has been sunk and 31,000 tons of ore has been taken out and shipped. During the winter the present level will be extended and the shaft will be put down an additional lift, so that by spring the mine will be ready for operations on a much larger scale.

There is not much doubt that wage reductions will be made in the lake mining region Jan. 1. They will probably not exceed 10 percent and may be graduated according to pay received and class of work.

At Hibbing, where the output of iron ore the past season exceeded 6,000,000 tons, there is now but one mine at work. This is the Sellers, adjoining the town. The Hibbing district runs from the Stevenson on the west to the Clark and Chisholm on the east. In addition to the Sellers several are developing underground. This is an index of the drastic curtailment on the Mesabi range. On no other range is the shutdown so complete or widespread, on account, doubtless, of the fact that Mesabi mines are easily reopened and deteriorate less when idle; also on account of the fact that so many are open pit and are not worked in winter under any circumstances.

Lincoln mine, at the village of Virginia, which was expected to remain in operation all winter, has been closed down indefinitely and more than 300 men are idle. The pumps are working and a force of 25 millwrights is at work installing new boilers, electric light and haulage plant, etc. The mine is well developed underground, with two shafts, and is capable of a very large production next year. Minorca is the only mine now in operation at Virginia. Lincoln belongs to Jones & Laughlin.

Shipments from Minnesota mines of the Republic Iron & Steel Co. for the past season have been as follows, gross tons:

	Shipments.	On Hand.
Union (half)	45,898	27,656
Franklin	64,027	71,430
Victoria	27,937	none
Bessemer	none	11,250
Pettit	52,706	2,006
Kinney	33,322	none
Wills	none	none
Total	223,926	112,342

Half of production of Union belongs to the American Steel Hoop Co. The Franklin, Bessemer and Pettit are now stocking ore for next year. The Kinney is an open pit and does not operate in the winter.

The Lake Angeline mine at Ishpeming is to reduce forces shortly. This is the last of the Ishpeming mines to hold out on its usual scale. The Cleveland-Cliffs in cutting off 350 men last week closed its Moro and Lucy completely and cut off the night shift at the Lake. Ishpeming, until these reductions, had been employing more miners than at any time in its history, and the town is not in bad shape now. The men let out are well able to stand a short period of quiet and most of them will probably go to work elsewhere for the winter.

Hemlock mine, at Amasa, has resumed after a brief period of idleness, and is working about 100 men now. The mine will stock during the winter and will develop new ground quite largely.

Alex. Maitland, of the mines of the Republic Iron & Steel Co., is interested in gold in the Black Hills, where he has been developing the Penobscot for about 18 months. He has a 40-stamp mill and cyanide attachment at work and is said to be making net about $1,000 per day. The mill is working on silicious blanket ores and is on the northerly extension of the Homestake lodes.

Calumet and Arizona copper mine, in which a number of Minnesota iron mining men are interested, made 2,644,000 pounds of copper in November. Its first dividend of $2 is payable Dec. 19. That takes $400,000. It is expected to be quarterly. The mine commenced production 53 weeks ago, and it is less than three years since the company was formed. After the payment of this dividend there will be about $1,000,000 in the treasury. The mine commenced production 53 weeks ago with a floating debt for equipment of about $350,000.

Practically all stocked ore at Republic, Marquette region, has been shipped this year and they are now stocking for 1904. It is not expected that any considerable reduction will take place; indeed the Cambria Steel Co. is said to be anxious to continue the mine in full operation.

A strike at Brotherton and Sunday Lake mines, on account of a 10 percent wage reduction, was settled Monday and many men went back to work.

Additional Lackawanna Steel Co. Contracts.

The Lackawanna Steel Co., of Buffalo, has placed an order with Morgan Construction Co., Worcester, Mass., for a merchant bar mill plant complete with accessory equipment. This mill is designed to take 6 x 6-inch billets and reduce them to all sizes of merchant bar in ordinary use. The Lackawanna Steel Co. has also placed an order with the same company for a gas plant to include 16 Morgan continuous gas producers equipped with George automatic coal feeds. These producers will furnish gas for the steel company's slabbing mill and 48-inch universal plate mill. The buildings for both installations have been ordered by Morgan Construction Co., of the McClintic-Marshall Construction Co., Pittsburg. Another recent contract let by the Lackawanna Steel Co. is for the construction of its open-hearth plant, plans for which were in abeyance for some time. The company will put in both Talbot and regular type open-hearth furnaces, the latter for the using up of its scrap.

The Vulcan Iron Works Co., of Toledo, manufacturer of steam shovels, advises us that the statement recently printed in a local newspaper and sent out in press dispatches, to the effect that its plant shut down indefinitely on Nov. 14 for lack of orders, is untrue in every respect. Suit has been brought against the local newspaper for $100,000 damages. The company adds that it has 150 men in steady employment and is getting more than the usual number of inquiries for steam shovels and dredges for this time of year, with prospects brighter than might be expected for the spring trade.

The United States Steel Corporation is said to be a bidder for the rails to be used in the construction of the Trans-Andine railway. The proposed railway will complete the connection between Buenos Ayres and Santiago and Valparaiso. Cars, locomotives and machinery of all kinds may be imported free of duty subject to the proviso that such importations are to be actually employed on this line. Bids will be opened at Santiago Dec. 15.

The Labor Situation.

CITIZEN'S INDUSTRIAL ASSOCIATION OF AMERICA.

The executive committee of the Citizens' Industrial Association of America, which was recently organized in Chicago, held its first meeting in Dayton, O., last week. President D. M. Parry and all of the members of the committee were present. The committee is as follows: F. M. McClary, Detroit; J. C. Craig, Denver, Colo.; N. F. Thompson, Birmingham, Ala.; J. H. Record, Minneapolis, Minn.; W. C. Shepherd, Wilkesbarre, Penn.; C. W. Post, Battle Creek, Mich.; James G. Hoile, Brooklyn, N. Y.; A. C. Rosencranz, Evansville, Ind.; John Kirby Jr., Dayton; P. R. Toll, Kansas City, Mo.; Berkley R. Merwin, New York; J. W. Van Cleave, St. Louis, Mo.; Frederick W. Job, Chicago; and E. F. DuBrul, Cincinnati.

A. C. Marshall, secretary of the Dayton Employers' Association, was elected secretary of the new organization and permanent headquarters will be established at Indianapolis. The establishment of a bureau of organization and a publication department was determined upon. The first convention will be held on Feb. 22 and 23 next in Indianapolis. The basic principles of the organization were determined as follows: An open shop, no sympathetic strikes, no restriction in the number of apprentices or output, and the enforcement of law. A number of important resolutions were adopted declaring against the eight-hour bill now pending before Congress, and instructing the secretary to secure the co-operation of all associations of employers to aid in defeating the measure; recommending that members refuse to put the union label upon any of their output; instructing the president and secretary to organize a labor organization bureau with a view to eliminating the lawlessness and undesirable workmen from shops operated by members of the association.

The following platform was adopted as an open letter to the public and affiliated associations:

"Resolved, By the executive committee of the Citizens' Industrial Association of America, that the present industrial conditions have become so deplorable by reason of the indefensible methods and claims of organized labor that the time has come when the employing interests and good citizenship of the country must take immediate and effective measures to reaffirm and enforce those fundamnetal principles of American government guaranteeing free, competitive conditions.

"In its demand for the closed shop, organized labor is seeking to overthrow individual liberty and property rights, the principal props of our government. Its methods for securing this revolutionary and socialistic change in our institutions are also those of physical warfare. Because of this warfare the industrial interests of the nation during the last year have been so injured to an irreparable degree. Many firms have been driven into bankruptcy and the cases are innumerable in which workingmen have been disabled and even murdered, while numerous families have been rendered destitute by reason of the tyranny and seditious attacks upon society by the strike organizations. A condition of anarchy has existed continuously in some states for months past, and in fact the acts of lawlessness committed under the sacred name of labor are of such frequent recurrence that the public sense of their enormity has become blunted. The period of great prosperity brought about by the unrestricted operation of the law of supply and demand is also being destroyed by the acts of violence of organized labor, and as a result we are now confronted with the possibility of a period of depression.

"While we most emphatically object to being classed as enemies of organizations of labor that are conducted upon lawful and beneficent lines, yet we are unalterably opposed to the present program of violence, boycotting and tyranny now being carried out by the majority of labor unions.

"We therefore urge the rapid organization of those who believe in the maintenance of law and order, and the perpetuation of our free institutions to the end that they may wield their full and proper influence upon the destinies of the nation. Since organizations exist for the apparent purpose of defying law and common sense and are able to intimidate and influence public men and municipal authority, there is no alternative left to those who desire to preserve bearable conditions in our body politic than that of forming counter organizations. It is only through the machinery of organization that we can hope to exercise a potent and salutary influence over public thought and the conduct of public officials, to the end that the rights of American citizenship can be assured to free and independent labor, the rights of property protected and legislation of a socialistic nature prevented from being enacted into law.

"We invite all associations, local, state and national, that sympathize with the purposes of the Citizens' Industrial Association of America to enter into affiliation with us at the earliest practical time, and we urge the immediate formation of local branches of the national organization in all the cities and towns where no organizations now exist that are eligible for membership in the association."

WORK OF THE METAL TRADES' ASSOCIATION.

The work of organization is having a marked effect among the metal trade workers. It is stated that in St. Louis, Cincinnati, Worcester, Detroit and Boston it is difficult for men to secure employment except through the employers' labor bureaus. The N. M. T. A. is spending thousands of dollars in organizing these bureaus all over the country, and hopes to have New York, Philadelphia and Baltimore in just as strong position as the places mentioned above in the very near future.

The Cincinnati Metal Trades Association issued a circular letter on Dec. 5, giving notice of the regular monthly meeting of the association on Thursday, Dec. 10, at 8 o'clock, in the association rooms. Mr. Baker, one of the foremen of the R. K. LeBlond Machine Tool Co., will read a paper on "The Ideal Employer," a previous meeting having discussed "The Ideal Foreman." The secretary's report shows that 29 men were sent out in November to fill places and of these 27 secured employment. Twenty-eight men were reported discharged; 57 men applied in person for work; 9 members of the association made calls upon the secretary for men.

The weekly bulletin of the St. Louis Metal Trades Association says in substance that last week showed an improvement in the demand for help. Eleven calls were received for all-round machinists and the demand for pattern-makers has been improving since Nov 1. Eight positions were filled by the association. The report says that St. Louis is having less of a slump than Eastern cities, but good men of all trades are out of employment. Few changes have been made in St. Louis shops, some laying off men, but the majority running steady.

The Detroit Employers' Association gave a dinner on Dec 3, at which 92 firms were represented. The secretary reports the condition of the association as most gratifying and since its organization there has been but one strike.

On Nov. 17 Secretary Robert Wuest, of the N. M. T. A., was the guest at a dinner given by the Worcester Metal Trades Association. An employment bureau is operated at Worcester after the methods of the N. M. T. A.

On Nov. 24 the manufacturers of Springfield, Mass., called a meeting for the purpose of hearing an address by Commissioner E. F. DuBrul, of the N. M. T. A., on the benefits of employers' associations, both local and national. On Nov. 25 Mr. DuBrul was the guest of the Boston Metal Trades Association. The N. M. T. A. has instituted a labor bureau there.

The monthly ballot of the N. M. T. A. of Dec. 1 contained the names of 12 representative concerns which are applicants for membership in the organization.

In the absence of F. A. Geier, of the Cincinnati Milling Machine Co., who has gone abroad for a three months' trip. G. A. Mayer is acting treasurer of the N. M. T. A.

Commissioner DuBrul, of the N. M. T. A., addressed the manufacturers of Philadelphia on Dec. 4 with a view to forming a local association and establishing a labor bureau. On Dec. 1 he addressed the Baltimore Metal Trades Association and was instrumental in forming a local labor bureau at that place. He will address the Philadelphia Metal Trades Association, preparatory to instituting a labor bureau in that city, on Dec. 9.

On Wednesday, Dec. 9, a meeting of the Cincinnati Employers' Association will be held to make arrangements for a mass meeting of all employers. D. M. Parry will be invited

to address the meeting. Charles F. Waltz, now secretary of the Employers' Council, of Marion, Ind., is prominently mentioned for the secretaryship of the Cincinnati Employers' Association.

AMALGAMATED ASSOCIATION'S SHEET MILL CONVENTION.

(Special Telegram.)

PITTSBURG, Dec. 9.—No decision has yet been reached by the sheet convention of the Amalgamated Association, which assembled here yesterday, relative to the removal of the limit of output, and it is doubtful whether there will be any decision today. Independent sheet manufacturers appeared at the convention yesterday afternoon to present their case and were again admitted this afternoon. In addition to the removal of the output limit they are urging a reduction of 20 percent similar to that made by the American Sheet Steel Co., but the constitution of the association will not permit this. It can only be done at a convention of the representatives of all the crafts concerned in making the scale and it is not likely such a convention will be called.

The report that President Corey, of the United States Steel Corporation, had arranged for a conference with President Shaffer, of the Amalgamated Association, is too absurd for denial. The scales of the subsidiary companies of the steel corporation are signed by their respective presidents and they alone would confer with President Shaffer if such a conference should be arranged. However, this is not the case.

BOSTON LABOR BUREAU.

The Boston Labor Bureau, recently organized by the founders, machinery manufacturers and others of the metal working trades, has opened headquarters at 34 Merchants Row, Rooms 55 and 56, Boston. Frank A. Wilson is in charge as secretary. The bureau is to be after the pattern of the well known employment bureau maintained by the machine tool manufacturers, of Cincinnati. Names of employes are registered with the bureau, together with information as to their shop experience, class of work at which they are most expert, and other details. The bureau thus serves the interests of both employers and employés. Recently there has been an unusual number of applications to register with employment bureaus, men of good records and of exceptional skill finding that through this medium their qualifications become known to a large circle of employers, and appreciating that in a time when there are more men than jobs their chances of holding positions are improved by such an agency.

LABOR NOTES.

The American Sheet Steel Co. has announced a 20 percent reduction in wages, to take effect at various plants Jan. 1.

A 20 percent reduction in wages has gone into effect at the Wheeling Corrugating Works, Wheeling, W. Va.

The Moline Plow Co., Moline, Ill., owing to its inability to settle with its molders, intends to have its foundry work done out of the city, and will abandon the foundry until the molders' strike is settled.

The Crane Co., Chicago, has notified 500 of its employes that their services will be required hereafter only five instead of six days a week. President Crane says that the move can hardly be said to be one or retrenchment, as it is usual to lay off men when stock is being taken. The company, he says, has not yet felt the effect of hard times.

The number of the employes at the Wabash car shops, Toledo, has been reduced 10 percent. About 100 men are affected.

The Chicago & Alton railroad has announced a 10 percent reduction in pay of section hands.

The Lake Shore Engine Works, Marquette, Mich., have reduced the wages of all employes 10 percent.

A general strike against the George A. Fuller Construction Co. and the sub-contractors of that concern has been declared by the executive board of the Bridge and Structural Iron Workers' International Association at Chicago. The fight against the Fuller Co. will be centered in New York City. The company is said to have contracts aggregating more than $20,000,000 in New York, Kansas City, Baltimore, Philadelphia, Omaha, St. Louis, Boston, Washington and Pittsburg.

Nearly 2,500 men were laid off Dec. 3 at Bellaire, O., when they reported for work at the plant of the Carnegie Steel Co. The works are closed for the time being on orders from Pittsburg.

The Builders and Trades Exchange, of Columbus, O., has decided to make an open fight against the resolution adopted by the city council, providing that preference should be shown members of labor organizations in all city work.

The men employed in the blacksmith department of the Reading Railway Co.'s car shops, Reading, Pa., who have been working 8 hours a day, have been notified that their day's work, until further notice, will be 10 hours.

The strike of machinists and other workmen engaged at the Kirtland street pumping station of the Cleveland Water Works, started because non-union men were employed on steam fitting work, has been settled. Non-union steam fitters will not be employed hereafter.

The Peninsular plant of the American Car & Foundry Co., Detroit, has largely reduced the number of its employes. Some work which was in the course of completion has been turned over to the company's other plant in Detroit, known as the Michigan Works.

Timothy McCarthy, the walking delegate of the housesmiths and bridgemen's union, has been convicted of extorting $300 from the Loebel Andrews Co., to settle a strike. He was sentenced to serve one year in the penitentiary. Recorder Goff, in his opinion, said that McCarthy was simply a tool of Sam Parks.

The plant of the American Steel Foundries, Sharon, Pa., has been closed down pending a settlement of the scale. The men have been asked to accept a 10 percent reduction, and are now considering the matter. About 700 men are idle.

In the wire mills at Joliet, Ill., the recent wage reduction averages about 12 percent. Men who were getting $60 per month are cut to $50. Machinists are reduced from 31¼ to 28 cents an hour.

The circuit court of Chicago has decided that the Franklin union of press feeders was in contempt of court as an organization for appointing and permitting pickets to interfere with the rights of individuals who had taken the places of striking press feeders. It is said that this is the first time in the history of trades unionism in this country that a union has been found guilty of illegal acts as a corporate body.

Manufacturers at Batavia, Aurora, Elgin, St. Charles and Geneva, in Illinois, have organized and have decided to increase the hours of labor from 9 to 10 hours. The first notice was served by manufacturers at Batavia and 350 machinists quit work Dec. 4. The manufacturers in the organization employ about 10,000 men.

Workmen in the rolling mills at Newport, Ky., are not disposed to accept the proposed 20 percent reduction in their wages, but arrangements have been made to run till Jan. 1, when, it is hoped, a permanent agreement will be signed.

The strike of the iron workers in the employ of the Baltimore Rolling Mill Co., Canton, Md., has been ended and the men will return to work, with the exception of one troublesome employe, whom the company refuses to take back.

The general strike of iron workers employed on contracts held by members of the Iron League and by the Fuller Construction Co. has had little effect. In some places the men have refused to go out, and in Boston 40 of the 50 men who ordered the strike went to work Dec. 3 without authority from the union, and those who did not return then went to work this week. The Parks union is threatened with disruption.

The wages of the laborers at the Bethlehem Steel Works, Bethlehem, Pa., who number nearly 1,000, have been reduced to 11½ cents an hour.

Part of its force was laid off last week by the Brown & Sharpe Mfg. Co., Providence, R. I. The hours of the ma-

An unusual exhibition of cordial relations between employer and employes was witnessed at Battle Creek, Mich., a few days ago, when about 200 employes of the American Steam Pump Co. gathered at the office in a body and started to the Central National Bank, where each opened a savings account as a compliment to the president of the bank, Hon. E. C. Hinman, who is also president of the pump company. Mr. Hinman was in the bank and greeted the men as they came in.

chinists remaining in the shops were reduced from 60 to 50 per week.

The workmen in the employ of the American Steel & Wire Co., Worcester, Mass., have been notified that a reduction of 10 percent in wages will be made, effective Dec. 8.

The wages of 400 iron workers employed at the Whiteley Malleable Castings Co., Muncie, Ind., have been reduced 10 percent. There is some aprehension of a strike.

About 700 employes of the North Reading plant of the Reading Foundry Co., Reading, Pa., refused to accept a 10 percent reduction in wages and are now idle.

One hundred employes of the Port Huron Malleable Iron Works, Port Huron, Mich., have gone on a strike for rather an unusual reason. They claim that the quality of the iron furnished them is such that their losses on waste have been large and they have been unable to make the wages to which they are entitled.

The 500 employes of the Inland Steel Co., Indiana Harbor, Ind., who last week refused to accept a 12½ percent reduction in wages and went on a strike, have reconsidered their action and returned to work. Officials of the Amalgamated Association deny, however, that any reduction of wages was agreed to by the association.

The wages of the machinists employed in the plants in the Youngstown, O., district will be materially reduced upon the expiration of the present contract, Dec. 17.

The blast furnace workers employed at the stacks of the Carnegie Steel Co., Youngstown, O., have had their wages reduced about 8½ percent, dating back to Dec. 1. Similar reductions will be made by all the independent furnace interests when their furnaces resume blast.

PERSONAL.

H. Coulby, of Pickands, Mather & Co., Cleveland, has been offered, it is reported, the position of manager of the Pittsburg Steamship Co., to succeed Manager Wolvin. If he accepts, the headquarters of the company will probably be changed from Duluth to Cleveland.

Evan Lewis, superintendent of the blowing department of the Lorain Steel Co., Lorain, O., and C. A. Loughrey, chief of the car accounting department, have tendered their resignations, to take effect Jan. 1. Dr. H. Robinson and Dr. Lewis, who for a number of years have been connected with the surgeons' office of the company, will also leave the company's service on the first.

The retirement of A. B. Wolvin as manager of the Pittsburg Steamship Co., referred to in these columns last week, has been officially announced. Mr. Wolvin started as cabin boy on a lake vessel and has become one of the most successful business men of the Northwest. He is largely interested in the Zenith Furnace Co., a number of steamship companies and other industries, to which he will hereafter give his attention.

Geo. G. Blackwell, of Geo. G| Blackwell, Sons & Co., Liverpool, Eng., sails for home on the Campania, Dec. 12, after a business tour of two months in the United States.

For the second time in his new home at New York, Andrew Carnegie entertained on the evening of Dec. 4 a number of his old associates in business. Covers were laid for 43. Those present were: Charles M. Schwab, Joseph E. Schwab, W. B. Dickson, James Gayley, Judge J. H. Reed, W. E. Corey, W. N. Frew, F. T. F. Lovejoy, George E. McCague, D. M. Clemson, D. G. Kerr, W. R. Balsinger, W. H. Singer, J. C. Bole, John McLeod, W. C. McCausland, W. W. Blackburn, G. D. Packer, A. R. Hunt, H. J. Lindsay, W. L. Leasure, D. D. Thomas, J. J. Campbell, George Lauder, Charles L. Taylor, Thomas Morrison, A. C. Dinkey, Thomas Lynch, Alex. R. Peacock, A. M. Moreland, H. P. Bope, L. T. Brown, T. L. Abbott, C. L. Phipps, John C. Fleming, A. C. Case, R. D. Frank, J. Ogden Hoffman, E. S. Mills, James Hunter, A. Monell, Thomas Klein, J. A. Potter, H. E. Tiner, E. H. Utley, E. F. Wood and George H. Whiteside.

Alex. K. Hamilton has succeeded F. duP. Thomson as chief engineer of the Lackawanna Steel Co., Buffalo.

George E. McCague, chairman of the traffic managers' committee of the United States Steel Corporation, and traffic manager of the Carnegie Steel Co. and of the Union Railroad, has tendered his resignation, to take effect on Jan. 1. Mr. McCague received his railroad training in the service of the Pennsylvania Railroad and has been connected with the Carnegie Steel Co. since 1890. It is probable that his assistant, L. C. Beihler, will succeed him.

Myron C. Wick, of Youngstown, O., formerly of the executive board of the Republic Iron & Steel Co., has assumed active charge of the New York Shipbuilding Co., of Philadelphia, succeeding the late Henry G. Morse.

Major W. H. Banks has retired from the management of the Huntington, W. Va., plant of the American Car & Foundry Co. It is understood that he will be connected with the plant of the same company at Wilmington, Del.

J. H. Price, who recently resigned as manager of the Pittsburg district of the American Steel & Wire Co., was remembered by his office associates who presented him with a leather chair. He is now assistant to the president of the Pittsburg & Buffalo Co., of Pittsburg.

John T. Gardner has tendered his resignation as superintendent of the rolling mill department of the Ohio works of the Carnegie Steel Co., Youngstown, O. His successor has not yet been appointed. His resignation takes effect on Jan. 1.

Fred Reel, assistant superintendent of the Brown-Bonnell plant of the Republic Iron & Steel Co., Youngstown, O., has resigned.

Edward O'Toole, division superintendent of the H. C. Frick Coke Co.'s operations in the Masontown field, near Uniontown, Pa., has resigned to become superintendent of the Ellsworth Coal Co., with headquarters at Washington, Pa.

Thomas Morrison, formerly manager of the Edgar Thomson plant of the Carnegie Steel Co., Pittsburg, had about 25 department heads at a house warming which he gave at his new home in Pittsburg last week.

Dissolution of the Danville Bessemer Co.

A majority of the shareholders of the Danville Bessemer Co., Danville, Pa., have voted to dissolve the company and have authorized the president and directors to dispose of the property to the best advantage. At a meeting of the stockholders, Dec. 3, about 205,000 shares of stock were represented, of which 20,000 were held by stockholders who objected to the voluntary liquidation of the company. The plant to be sold comprises a blast furnace, rolling mill, shovel plant, machinery and 42 acres of land. This is the end of one of the 1899 boom companies. It had a capital stock of $1,200,000, and had paid $800,000 for the plant.

Charges of having organized the Danville Bessemer Co. for the purpose of purchasing the plant of the North Branch Steel Co., at Danville, at a highly inflated value, from a son-in-law of one of the promoters, and then keeping the difference between the price paid and the money the stockholders thought was paid, amounting to $325,000, are made in a suit filed Dec. 6 at Philadelphia against the promoters, Col. A. Loudon Snowden, ex-State Senator Charles A. Porter, C. Kennedy Crosson and others by John J. McCloskey and Louis A. Levin, two stockholders. The court is asked to compel the defendants to make known the profit they made in the sale of the plant to the Danville Bessemer Co.; the persons receiving the profits and the amounts; to return the profits into the company's treasury and, if necessary, appoint a receiver. The complainants each hold 200 shares of stock at par value of $5.

Henry E. Ide, receiver of the Townsend-Downey Shipbuilding Co., New York, has been authorized to sell $100,000 worth of receiver's certificates at par and pay the $35,000 arrears of wages and insurance due; also to operate the yards for 30 days on work in hand or new work.

The Central Freight Association roads have decided to refuse the application of the iron and steel manufacturers for a reduction of freight rates on domestic shipments of steel rails.

It is the present expectation that the Detroit Iron & Steel Co.'s furnace will go in blast early in January. Labor troubles have greatly hindered contractors on construction work.

Pittsburg Foundrymen's Association.

The regular monthly meeting of the Pittsburg Foundrymen's Association was held at Pittsburg on Monday evening, Dec. 7. The following were in attendance:

Wm. Yagle, Yagle Foundry & Machine Co.
C. W. Jones, Rosedale Foundry & Machine Co.
John McLaren, Phillips & McLaren.
A. W. Slocum, Keystone Car Wheel Co.
S. D. Sleeth, Westinghouse Air Brake Co.
E. A. Kebler, Matthew Addy & Co.
Mr. Schade, Braddock Machine & Mfg. Co.
Paul Hay, Whiting Foundry & Equipment Co.
C. F. Menges, Taylor, Wilson & Co., Ltd.
H. McEwan.
Wm. Stark.
M. J. McMahon.
Thos. McBride.
H. S. Ridenour, Thos. Carlin Sons Co.
H. E. McCoy, Porter Foundry & Machine Co.
Valentine Legler, Yagle Foundry & Machine Co.
Thos. Campbell, Westinghouse Air Brake Co.
P. H. Larson, Seaman-Sleeth Co.
Jacob Lane, Keystone Car Wheel Co.
A. E. Ortmer, Jones & Laughlin Steel Co.
Frank Lewis.
Mr. Lawler, Pennsylvania Malleable Co.
A. A. Lane.
C. J. Schmidt.
R. B. Hope, Mackintosh-Hemphill & Co.
John Birch, Pittsburg Malleable Iron Co.
W. J. Wallace, Westinghouse Air Brake Co.
John Lauder.
W. J. Reardon, Westinghouse Electric & Mfg. Co.
C. W. Winder, Westinghouse Electric & Mfg. Co.
John Maley.
C. B. Carlisle, Eagle Foundry & Machine Co.
Mr. Wakeman.
Mr. Marshall.
Mr. Phillips and Mr. Phillips Jr., Phillips & McLaren.
Mr. Johnson, Taylor, Wilson & Co., Ltd.
Chas. G. Smith, Chas. G. Smith & Co.
Harry Ow, Mesta Machine Co.
C. E. Fitzgerald, North School, Pittsburg.
Prof. Connelly, Supt. Manual Training,, Allegheny, Pa.
Bryan Robertson, Field-Evans Iron Co.
Robt. Taylor, Taylor, Wilson & Co., Ltd.
S. F. Warren, Pennsylvania Malleable Co.
Mr. Malone, J. S. McCormick & Co.
W. H. McFadden, Mackintosh, Hemphill & Co.
W. T. Mobberly, Hall Steam Pump Co.
B. D. Fuller, Westinghouse Electric & Mfg. Co.
R. F. Barker.
A. O. Backert, *The Iron Trade Review.*
G. P. Maury, Metallurgical Laboratory.
Martin Shurk, Keystone Car Wheel Co.
Mr. Bourne.
Mr. Moore.
Mr. Baur.
W. J. Dorsey, Enterprise Foundry Co.
F. H. Zimmers, Union Foundry & Machine Co.
T. J. McGonnell.

The papers of the evening were on "Pattern Making," and were particularly interesting since they brought up a subject, which, though of large importance, is not much discussed by foundrymen. The speakers were J. C. Warne, of the Pennsylvania Casting & Machine Co., and Edward C. Fitzgerald, superintendent of manual training in the North School, Pittsburg. Both papers are given below:

Mr. Warne's Paper.

In this paper I shall confine myself to remarks on wood pattern-making as distinct from metal pattern-making, being more familiar with that branch of work. I have divided my subject under the following heads: Materials, Machinery, Men and Patterns.

Materials.—As is well known to all foundrymen, white pine is almost universally used in the making of wood patterns, it being well adapted in its nature for such service, light, easy to cut, permits of a nice finish, retains its shape, not warping or twisting like other varieties of the fir woods, and if properly taken care of in the foundry will stand a good deal of wear, especially if rapping plates are provided. Its availability in large quantities to meet an ever increasing demand is also in its favor. Taken altogether it is hard to find a wood equal to it, its first cost being considered. Of all woods for pattern work mahogany is the best, partaking of the nature of both hard and soft woods, being practically impervious to damp, therefore retaining its original shape. It stands a great deal of hard usage and is oftentimes used in preference to iron patterns, particularly in Europe. Its great expense, however, almost precludes its use here.

Among the hard woods cherry is by far the best. It retains its shape fairly well, is not so hard to cut as other hard woods, makes an excellent finish and stands ordinary wear and tear admirably. Patterns of white pine faced up with cherry in the wearing parts will last for years the hardest kind of service, if kept well varnished, such as car wheel patterns. The writer has had car wheel patterns in almost daily service for 10 years, 16 to 20 molds being put up each day from a single pattern and the latter being only withdrawn from service to have repairs made to flanges and rim.

The grades of lumber to be used should vary as the job. I mean by this that for patterns from which only one casting is to be made, with little probability of another being made in the future, cheaper material can be utilized so long as the lumber is sound and free from checks. A few sound knots do not signify as these can oftentimes be cut out with advantage by a little discretion of the pattern-maker when marking out his material. Lumber full of fine checks, although it may be perfectly clear, is an abomination to the pattern-maker and a source of loss to the buyer both in time and material.

Where large quantities are used it pays to buy largely and store yourselves. Kiln dried lumber is never so good as the naturally seasoned lumber and where large quantities are used it will pay to take the trouble to paint the ends of the planks or boards as this will prevent checking of ends and a considerable saving of material is effected.

For standard patterns where many are required to be made, the lumber cannot be too good. All lumber used in pattern work, whether No. 1, 2 or 3 quality, should be well seasoned. It is no economy either for the pattern-maker or his fellow worker, the molder, to make and use patterns from lumber such as is sometimes used, where the water will ooze out in front of a chisel cut or fly in your face when turned in the lathe. Patterns made from such never give satisfaction and if wanted again in a month or so, owing to shrinkage in wood have to be dressed over again and the by-wood taken off to make it workable. If this is not done and the molder gets it, then the molder has his own troubles in drawing from sand and patching breakdowns, etc., and the job is one of anything but comfort to him and poor satisfaction all around. I am aware it cannot always be avoided but should be eliminated as far as possible.

Racks for keeping lumber on edge and easy of access should be provided in all pattern shops. At the high price at which the best pattern pine is now bought, supervision should be kept on the pattern-makers, who at times are apt to use the very best where a cheaper grade would answer the purpose fully as well.

Gum shellac varnish is the standard article for varnishing wood patterns. The best results are obtained from the best gum shellac and grain alcohol, and many pattern-makers prefer to make it themselves rather than trust to the uncertainty of results obtained from that bought from varnish makers. Still there are some good brands on the market, and when you get the one that satisfies yourself and the molder, who will soon be heard from in unmistakable terms, if his pattern clogs the sand, why stick to that brand and do very little experimenting with any other, if you wish to keep yourself out of trouble.

Leather fillets are now used almost universally and have come to stay, especially for a quick job, but for permanent pattern work nothing surpasses the wood fillet. Fillets of putty are also quickly put in and inexpensive if time can be allowed for it to get hard. When varnished over it forms a permanent hard fillet.

Glue necessarily enters largely into the construction of patterns. Avoid cheap grades. The desirable glue to get is one that will set quickly and hold fast. These can be obtained but if not to be had, as a rule the slow setters are the strongest. If time is the object more than strength, then use the quick setters.

Machinery.—Machinery plays a most important part in the pattern shop. Thirty years ago a circular rip saw, band saw,

and lathe, was about all to be seen in an ordinary pattern shop and sometimes the lumber was not even planed. Hand work was then a very large factor in the production of patterns. Today most pattern shops are, or ought to be, equipped with the best machinery possible to get.

The jointer is a most useful machine and a great labor saver. No jointer should be permitted to have shop room that will not plane absolutely true so that work can be glued up straight from the machine. If it takes the place of a hand jointer plane, from which it takes its name, instead of a jack plane, then it fulfils its mission and is appreciated by its users. For pattern-makers, like most other craftsmen, desire to get along with the least expenditure of muscle where possible.

A good band saw with wheels not less than 36 inches diameter with tilting table, such as can be bought from a reliable house, is also desirable. A small and large wood turning lathe should be provided, also wood trimmers, and universal circular saw table, and for large shops, a swing cut off circular saw. There should be work benches with quick acting vises, steam heating glue pots, and a liberal number of these should be supplied.

For a well equipped pattern shop I would recommend the purchase of machinery from makers who have made a special study of pattern shop requirements and even if first cost is more it will be cheaper in the end.

I have outlined the machinery required in most pattern shops, but machinery should be bought suitable for the particular line of work the company is engaged in, which the foreman in charge will soon discriminate in favor of.

The end and aim of the best machinery in the world will be defeated if proper care is not taken of it. In most shops it will be usually found there is one man who has the special knack of getting the machines to run just so. That is the man to keep at that work. I do not believe in every Tom, Dick and Harry fixing the machines. What is anybody's job is nobody's job and you get nobody's results. Employers should get all that is coming from the investment and the pattern-makers will appreciate nice true cutting machinery.

Men and Patterns.—Accuracy should be the first law with every pattern-maker. Speed is also a very important factor but if accuracy is sacrificed to speed, there is too often sorrow all along the line from the pattern-maker to the machinist and much valuable time and considerable loss of money is involved. A good all-round competent pattern-maker should have "an eye like a hawk and a head like a Philadelphia lawyer." This is a definition I once heard. While somewhat exaggerated and overdrawn, it shows that there must be ability of a high order shown. He should have a thorough knowledge of drawings, able to read same truly and quickly, be no mean draughtsman, and the greater his mathematical and mechanical knowledge, the better chance he will stand for a better position and the more valuable will he be to his employer. He must possess a true eye, which will be found a great advantage to him. On him will devolve largely the amount of labor put into patterns.

If the work to be done is permanent standard patterns, such for instance as steam pumps of graduated sizes, too much care in reason cannot be expended on the job. Parts should be well fitted together, the proper amount of draught given. If the patterns are in halves he will provide the proper amount of metallic dowel pins. Avoid wooden dowels as much as possible, with sufficient number of rapping and lifting plates for drawing patterns. This latter item is too often forgotten and only brought to the pattern-maker's notice when he sees the results of the molder's draw spike. Always put it in the weakest part of the pattern and where the grain of the wood is shortest. Do not skimp rapping plates, lifting plates, and drawing straps in permanent patterns. It pays for the extra cost and time of putting in.

Coreprints of sufficient length to sustain weight of cores without crushing molds should be used. The pattern-maker who gets his intricate cores correct and to fit the mold exactly has solved one of the most difficult problems in pattern-making and will save himself and the molder who handles his job much sorrow and heart-burnings, not to say anything of the cuss words thrown in. Indeed no pattern-maker can be considered successful unless he has acquired the faculty of having his cores well fitting and correct. More skill is frequently required in making core boxes than patterns. This is well known among foundrymen.

It frequently happens that a pattern is required for only one casting. I have known men who could not seem to appreciate this fact but would spend just as much time on the job as if there were a hundred required. This is where the judgment of the good pattern-maker is shown.

In work of this kind a strong substantial pattern is not necessary, sufficiently strong to retain its shape and stand the molders' handling will do. Extra finish not required. So long as the pattern is accurate in its essentials is all that is necessary. These are the cases where the pattern-maker shows his value to his employer in his ability to discriminate and be governed accordingly. These traits of the pattern-maker's makeup are more readily observed in men who have been raised pattern-makers from their youth up than in men who have acquired the trade in after life and have worked at other wood working trades. Of course there are exceptions to every rule.

A good pattern-maker will always be on the alert to catch the draughtsman's errors, and draughtsmen are liable to err, as every pattern-maker of experience knows.

Another feature of pattern-making: Oftentimes the expense of a costly pattern can be avoided by sweeping up the work, and a good spindle and socket should be an adjunct to every foundry where machinery castings are made. A little getting together of the foundry foreman and boss pattern-maker will often produce a considerable saving in pattern work by the use of the spindle and sweeps. How easy, for instance, a bed of sand can be leveled up for open sand castings, a good level sweep board swung around on a spindle, and you have it, doing away with straight edges and leveling strips, producing better and quicker work as every molder knows. The foundry foreman and pattern-maker should work hand in hand. The best results are obtained this way. "Two heads," etc.

The pattern-maker does not always see a job through the molder's eyes and his methods can often be improved by the advice of the molder, and the molder will work in a happier frame of mind if the pattern is to his liking.

In the making of patterns it is necessary to have glue in most cases to secure the component parts permanently together, but there are lots of patterns that could and ought to be made with a minimum amount of glue instead of a maximum, as is too often the case. Where glue is exposed to the damp sand trouble is invariably caused, and the less glue the better. There is such a thing as having patterns too securely made, as every pattern-maker knows when he has to make some simple changes and finds hubs and prints glued fast and has to break them all to pieces, tearing the under wood with it when he has to remove them, when the unscrewing of a wood screw or the hub or print being loose ought to suffice without the dab of glue under it.

The proper construction of patterns not only for strength in themselves but also to allow of the easiest and least expensive method of molding, is the desirable thing in pattern-making, consistent of course with the end in view of all patterns, i. e., the making of the best castings with the least expense to the employer of both pattern-maker and molder, for in these days of sharp competition you cannot afford to be generous either in time or material. Patterns are often made by the pattern-maker, especially if the patterns are made in a job shop, with a view to getting the job out of hand as quickly as possible, and the best methods are not used. The molder has to finish the job at an additional cost of time, which would have been better put on the pattern before it left the pattern shop.

However, you cannot blame the job shops. They have a living to get and like everyone else are not working for glory.

Shrinkage of castings is a very important item in pattern-making. In some castings of very heavy type scarcely any allowance for shrinkage will be necessary. In the heavier type of machinery castings 1-12 of an inch per foot; in the lighter grades of machinery castings, 1-10 of an inch per foot, and in castings such as builders use ⅛ of an inch per foot. I have found it not wise to have one allowance for all castings, as the best results will not be obtained if this is followed. For brass and steel 3-16 of an inch per foot will be found about right.

A few words in conclusion as to the pattern shop: Have it amply lighted with daylight and fully lighted artificially when necessary. Cover the walls if brick, with whitewash, and if wood, with white paint. If they are not so, first try the experiment of a little whitewash and note effects. A comfortable heat should be maintained. If not, the effects of glued work will be largely minimized and poor results obtained. Pattern-makers should be crowded no more than necessary. All these things tend to successful pattern-making.

Mr. Fitzgerald's Paper.

Early in the 19th century and up until 1840, little was known of pattern-making as a distinct craft, especially in this country. The man who made patterns might also build your furniture or, as in the majority of cases, the millwright of a firm worked in that capacity. This was before the steam engine had been perfected, or the application of electricity, hydrostatics or pneumatics as a factor of power. Since that time a complete evolution has taken place in this particular branch of industry. Unlike many of the crafts which have been portioned off, until little remains to identify them, pattern-making has advanced in technique and skill, until today it stands for more than the mere knowledge of woods and tool manipulation. The man who would make the patterns of the present and the future should have a fair knowledge of all the other branches of industry, have sufficient training in mathematics and also have some idea of design, for it matters not how complete the drawing of the machine or part may be, there are opportunities for the workman to improve so that the finished product may be all that is desired.

Without a knowledge of drafting and molding this would be impossible. There are many other factors which enter into the construction of patterns at the present time. The modern methods of molding, with iron folding flasks and molding machines, would change the whole arrangement of a pattern which had formerly been made in an ordinary parted flask. This method of molding, where feasible, is to my mind the best as far as the pattern is concerned, as there is less strain, it can be built much lighter and last longer.

I was somewhat surprised recently while visiting Mr. Fuller, of the Westinghouse Electric & Mfg. Co. in Allegheny, to learn to what extent they were using the molding machine. Castings weighing from 16 ounces to 1,200 pounds are made sucessfully. Patterns worked in this manner would certainly last a long time. Either of the above forms of pattern could only be used where they are doing standard work. The first cost would be too great where only a few castings are wanted. In the latter case, I feel the mistake is made quite often on the point of economy, by rushing a pattern through half finished, in order to reduce this item of expense. Not that I believe that it is necessary to give every piece of work the so-called "piano finish;" but how often have we seen a pattern come into the foundry all be-striped, showing the molder where fillets are desired. The time consumed in striping could have been used in putting in fillets of leather or some other material, the cost of which would be much less than the time consumed by the molder in cutting in and patching up, with a much more creditable casting in the end.

Rather than economizing along this line, I would say, see to it that the pattern be such as would make the operations which follow as simple as possible, that time and labor might be saved in the foundry and machine shop.

Personally I know of several instances, where after giving the pattern-maker proper time to think, not only of the method of making the pattern, but of the work which is to follow, he has not only increased the output but has cheapened the cost of production from 10 to, as in one instance, 60 percent.

Skeleton patterns and sweeps have their place, and little improvement can be suggested at this particular time. However, in the former case a few minutes devoted to deep study would produce the results at a nominal cost for the pattern work.

I will not go into details in regard to the different branches of industry, and the pattern work pertaining to each, but rather touch upon some of the most important points that enter into the constructive side of pattern making, classifying them under the following heads: Working Drawings, Selection of Material, Machining and Shaping, Assembling, Finishing.

Working Drawings.—A full size working drawing, in the majority of cases, should be made, allowing shrinkage and showing finish on parts required. Where the piece is too large to permit this, such parts as are most important, or where there is any intricate core work, should be worked out in detail. This will not only aid the worker, but be of assistance to the foundryman, who could see where he would like templates or test pieces for finding thickness of metal, etc. The time consumed in this is not wasted, for during this period he is revolving in his mind not only the best method of construction, but the simplest way of molding, which after all is the best.

Selection of Materials.—Material should be selected with thought as to quality and fitness for the work required. For large patterns, white pine has generally been found to be the most suitable; for small patterns that are worked to a great extent, hard wood or metal is best adapted. Also loose pieces, bosses, lugs, etc., on standard work might be made of either of these materials, as such parts are subjected to more or less wear. One of the difficulties the worker will encounter is the tendency of woods to warp and shrink, especially in light shell patterns. A good plan would be to keep a supply on hand, of perfectly dry lumber of different thicknesses, for such emergencies. However wood is very susceptible to atmospheric conditions and should be kept in a dry place. A rack constructed to store the lumber on edge, with space between each board, permitting free circulation of air, would be both convenient and profitable. Lumber containing a great amount of sap should only be used in such parts as do not come in direct contact with the sand, as it decays rapidly and is more apt to warp than the heart wood.

For small light work, where the patterns are run in cards, white metal, brass and aluminum are the metals generally used. Iron castings off an original pattern if coated with wax to preserve a smooth surface make very good patterns; in fact, same fair sized castings are treated in a like manner. This is especially so in stove work.

Machining and Shaping.—Band saws, circular saws, planers and lathes were built to perform certain functions and should be used to their fullest capacity in shaping the pattern. These machines are almost indispensable. The band saw with its tilting table can be so adjusted that irregular shapes may be sawed to the line, thus dispensing with much hand labor that would be necessary without such a tool. The modern universal circular saw with its many adjustments saves time and material. Staves for barrel shaped patterns can be sawed just to the angle without a particle of waste, can also be used for making butt joints in segment work, by fastening a form to the sliding table and using the cross cut saw. For roughing out round core boxes it is a great help. However, in pipe fitting shops the majority of the core boxes are cylindrical, and they have special machines designed to do this.

In preparing work for the lathe, all calculations as to diameters, lengths, etc., should be made as close as possible, so that unnecessary labor in turning off and waste of material may be avoided. The pony planer and surfacer are valuable machines for dressing lumber to required thickness and shapes.

Where a shop is equipped with a complement of machinery and a fair sized force of men is employed, there should be one man whose duty it is to keep the shop tools in good condition; otherwise all lose a large percentage of their efficiency.

Assembling.—After the material has been cut and shaped to convenient size for assembling the pattern, it should be put together in a manner to offer the least resistance in drawing it from the mold. Where there is great depth and comparatively little draft, it would be better if the grain of the wood ran at right angles with the parting or on a line with the lift. In extra heavy work, such as bed plates and bases for blowing engines, the form adopted by the Mesta Machine Co. seems to me to be the most feasible. The patterns are made in sections with guide strips so arranged that when it is assembled in the pit, all parts adjust themselves to their proper position. This also relieves the strain on the pattern in drawing from the sand, each piece being drawn separately. Patterns for pipe fittings are now made with flanges, branches, and core prints interchangeable. This is an excellent plan, as it makes comparatively few patterns cover a wide range of sizes and shapes and overcome, to a certain degree, the old method of patching here and there with pieces, to get the size of casting desired. This system is more generally adopted in shops that make a specialty of fittings. Work should be screwed together rather

than nailed where convenient to do so. Where glued joints are required, hot glue is the best for general use. The cold prepared glues are probably better for thin wood, as hot glue would tend to swell the wood, which after drying out would change its shape.

There are many makes of metal dowel pins on the market for parted patterns, and they are certainly a vast improvement over the old wood pins, which are apt to swell and cause great annoyance to the molder, who in his anxiety to make it work free either gets the pin too small or the hole too large.

In certain classes of machinery, castings are made in pairs, and one pattern is made to perform a double duty by using detachable sections. In such cases all parts that are interchangeable should be properly adjusted and marked, so that the change may be made without inconvenience.

To go into detail in regard to the character of pattern required for dry sand, loam and chilled work would make an almost endless paper, as each is worthy of specialization.

Finishing.—The amount of time and labor required for this last operation is governed largely by the number of castings that are to be made. All patterns should be coated with shellac, varnish, or some such preparation, to protect them from moisture and to give a hard, smooth surface. Patterns that are in use regularly should be varnished and gone over from time to time. The old adage, "A stitch in time saves nine," holds good even in pattern work. Draw plates and rapping plates are essential on good work. They are convenient and might save the pin holes.

The position of cores in the mold should be shown plainly on the pattern. This is done by using a different color on the core prints from the main body of the pattern. Every firm should have a well regulated system of recording patterns. Raised lead letters are the prevailing form and seem to be best. And last, a storehouse of ample dimensions should be provided where patterns can be handled to an advantage.

In conclusion I wish to say that the pattern-maker, as time has progressed, has evolved from the position he once held in the eyes of an English manufacturer, that of a "necessary evil," to a factor in the net earnings of the firm by whom he is employed.

Discussion.

There was a free interchange of comment on the papers and much interesting information was brought out. Mr. Harry Ow, superintendent of the patternmaking department of the Mesta Machine Co., West Homestead, Pa., said that patterns for the molding of blowing engine bed plates at their plant are made in sections, as they are handled with less wear and tear and more dispatch by the molders. On some of the larger bed plates the face is made in skeleton, enabling the molder to ram through with more accuracy and the sand is rammed harder and the patterns are assembled on the skeleton. The patterns are dovetailed with tongue and groove, and the patterns being made in sections enables the molder to lift out the center pieces, which leave the outside pieces free and loose. Where a large number of castings are to be made from a large pattern, he said that the sectional pattern is by far the best to use.

Benjamin Fuller, of the Allegheny plant of the Westinghouse Electric & Mfg. Co., said that castings from 20 to 40 tons in capacity are made without any patterns from built up cores. The usual allowance of shrinkage of ⅛ of an inch per foot is not necessary when castings are made this way, 1-16 of an inch being allowed and very often there is no shrinkage whatever. In addition this method is not costly, as not all the sand is burned out, some of it being saved for future use. In explaining this practical absence of shrinkage he said that the burning of the generated gases in the cores creates an intense heat which is retained for a considerable period, the casting cooling more slowly and the heated cores having a sort of an annealing effect. In addition the casting is much softer and can be annealed much more readily than when made in wet sand; it also has greater strength. Where metal patterns are used, he prefers the brass pattern, as the brass is of a uniform thickness throughout, especially where sheet brass is used, this uniform thickness not often being obtainable in an iron pattern. With reference to varnishing the patterns, he said that it is absolutely necessary that only the best shellac, cut with grain alcohol, be used, as this is essential where a pattern must lie in the sand from three to four days.

S. D. Sleeth, of the Westinghouse Air Brake Co., thought that too much importance cannot be laid upon the necessity of using the best shellac to prevent the sand from adhering to the pattern. He said that pattern-makers should have a better knowledge than the majority have of molding. At his plant the pattern-maker apprentices are compelled to spend about a year in the foundry in order that they may become acquainted with foundry practice, and as a result excellent pattern-makers are produced. Very few pattern-makers are up on the art of preparing patterns for the molding machine, which is now making big inroads in foundry work. He added that excellent results are being obtained from the molding machine, the sand being rammed harder and more uniformly than can be possibly done by hand, and in addition there is practically no blowing of castings. He cited an instance of reducing the cost of making molds on the molding machine where a large number of duplicate castings were called for. The floor molding cost $1.50 per mold, but after much work and study the pattern was fitted on the molding machine, with the result that the cost of making each mold was reduced to 48 cents. The cost of fitting the pattern in this case to the machine was large, but the great reduction in the cost of making the molds easily overcame this first cost in a short time.

Mr. Taylor, of Taylor, Wilson & Co., Ltd., created much merriment with his pointed remarks. He said that the pattern-maker is ever ready with an excuse for a bad pattern and that many of the pattern-makers prefer that the "eye be put on their work instead of the rule."

Messrs. A. W. Slocum and J. C. Warne spoke of the manufacture of car wheel patterns. These are made of white pine and cherry, the pine forming the center of the pattern and the cherry the wearing portions. Owing to the long wearing qualities of the cherry, patterns have lasted from eight to ten years with but little repair, and Mr. Slocum said that as many as 30,000 molds have been made from one car wheel pattern according to his own observation, the patterns being in use 300 days in the year and from 18 to 25 molds being made from each every working day.

Prof. Connelly, of Allegheny, said that Director Hamerschlag, of the Carnegie Technical School, would like to have practical pattern-makers and foundrymen lecture to apprentices and journeymen in his school, and later in the year would appear before the association for the purpose of asking the aid of the members in his work.

Chrome Steel Works Will Be Moved.

The stockholders of the Chrome Steel Works, Brooklyn, N. Y., will hold a meeting Dec. 4, for the purpose of voting upon a proposition to dissolve the corporation. The company has nearly completed the erection of a large plant at Carteret, N. J., and the plan of the company is to liquidate in New York, and organize again under the laws of New Jersey. The company was incorporated 35 years ago, and it has carried on the manufacture of cast steel, with special attention to parts for mills, and to mining machinery. The new site at Carteret is on the line of both the Pennsylvania railroad and the Central of New Jersey, and is on the shore of Staten Island Sound. The present capitalization is $180,000, and the capital under the New Jersey charter will be $1,000,000. About 150 men are employed in Brooklyn and this force will be considerably increased. Brooklyn has been very unfortunate recently in losing a number of its important industries.

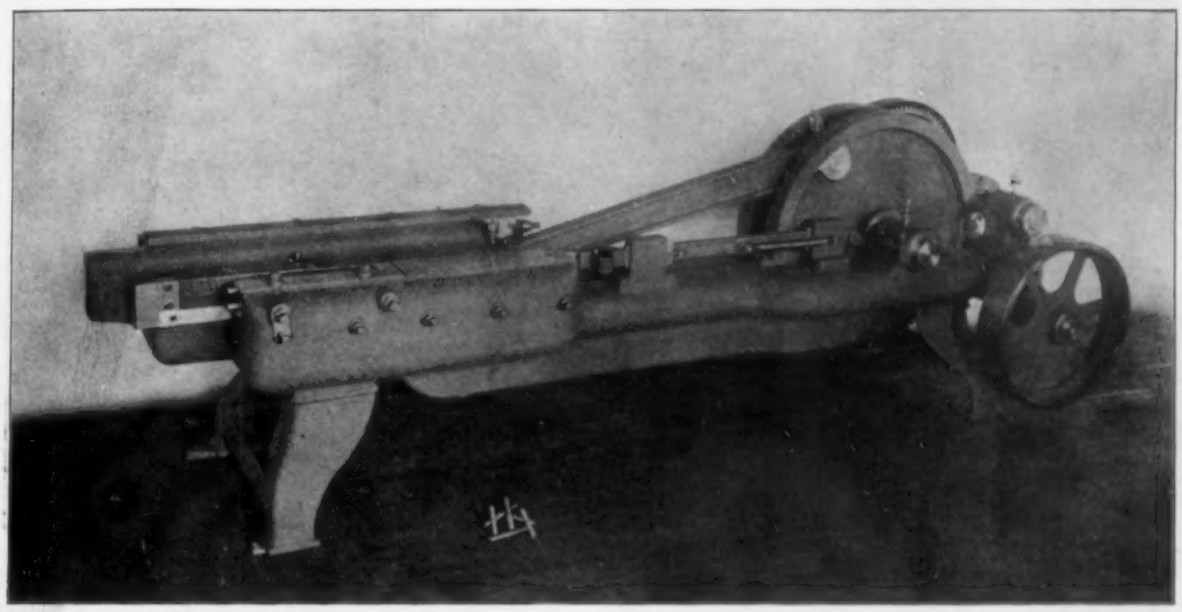
A number of important contracts for air brakes manufactured by American concerns have recently been placed in foreign countries. The state railroads of Russia have given an order for the equipping with air brakes of all the cars in operation on their lines. Of this order half went to the New York Air Brake Co., and the other half to the Westinghouse Co.

The Foreign Trade Association of America has appointed a committee to obtain lower freight rates on lines, other than iron and steel, which cater to export business. The members of the association claim that the reduction on iron and steel, to the exclusion of all other manufactured products, is an unjust discrimination.

AN IMPROVED THREAD ROLLING MACHINE.

The accompanying illustration shows one of the latest thread rolling machines built by Blake & Johnson, of Waterbury, Conn., and designed for all styles of machine screws up to 1⅛ inch diameter by 3½ inches long. Some of the prominent features embodied in this machine are these: The center load line instead of overhang; the readjusting of the so-called trolley track in its true relation to the maximum load of the machine while at its highest duty; the redesigning of the main frame throughout and adopting the box pattern, which insures greater rigidity with less weight, allowing these larger machines to be placed upon an ordinary floor instead of on ground floors or special foundations. These machines are regularly built in five sizes—from the No. 1 machine, capable of rolling threads up to 3/16-inch diameter to that rolling 1⅛ inch diameter.

The new designs are the result of data collected by Blake & Johnson while building machines for this purpose for the past fifty years. The first machine was built with the plain slide and overhang connection, and the present design embodies the result of many years of study and actual practice. The improved machine makes it possible to roll a true thread upon rough stock; that is to say, the rolled part of the thread will be correctly shaped, the irregularities of the cross section of the thread being only such as may be in the stock. The burr which is nearly always left by a cutting tool is eliminated when the threads are rolled, as there is no stock cut away—merely an upsetting of the metal.



BLAKE & JOHNSON THREAD ROLLING MACHINE.

In producing these threads, experience shows that successful rolling requires absolute rigidity, and this feature has had particular attention. The manufacturers also note that tests of the slides and ways of the old styles of machines showed that the least variation in these surfaces which was produced by actual work would be transmitted to the rolled thread. In order to overcome this, the "trolley" was introduced, with hardened and ground tool steel rolls running between hardened and ground tool steel plates. This entirely overcame the trouble. Another feature of the use of the "trolley" is the reduction of friction between the slide which carries the reciprocating die and the bed frame proper. When rolling threads 1⅛ inch diameter, there is nearly as little perceptible friction and waste of power as when rolling a thread ⅛ inch diameter.

It was noticed that the slides, if used continually for a number of years, required re-dressing. It was finally decided to use the center load line, and thus the question of the slide holding its alignment was of course eliminated. Another problem was presented by the scale from the rough stock and the fuzz from the finished stock dropping between the dies and reaching the lower surface of the slide. It was only a matter of time until this would be so cut that it in turn would require re-dressing. To obviate this, a slot for the maximum diameter of each machine was made in the bed plate, with a stripper attached to the slide so that at each revolution of the machine or production of a screw, the scale or fuzz dropped in this slot, and the scraper just described threw it out, thus insuring a clean working surface for the slide.

As to the accuracy with which threads are rolled with these machines some work in connection with the last suspension bridge constructed between New York and Brooklyn, just about to be opened to the public, is cited. The large main cables of this bridge are composed of innumerable wires about 3/16 inch diameter, which, although each wire is drawn to great length, had to be spliced to each other to form the great cables. Every wire which was put into these cables had to be tested individually for tensile strength, and each end of each wire was given a rolled thread in these Blake & Johnson machines. The wires were then spliced or drawn together with a sleeve into one continuous strand. The threads had to be exactly uniform, and had to fit the sleeves perfectly with absolutely no difference between any two threads. It was impossible to accomplish such results with a cutting die, as one die would only cut about ten threads in the high carbon wire from which these cables were made. With these machines there was no trouble in rolling the uniform threads on this wire. All of the splices were made to stand severe tests for tensile strength, and the results were most satisfactory. Thousands of tons weight are sustained by these little rolled thread splices.

The largest size of thread rolling machines shown in the illustration is perfectly adapted to the rolling of threads on railway track bolts and all of this heavier class of bolts and screws. The dies can be made for rolling equally well, the U. S. S., Whitworth standard, Harvey grip, straight "V" and any other threads which may be desired.

One hundred and fifty men, chiefly iron workers and carpenters, have been discharged from the construction and repair department of the Brooklyn Navy Yard. It is estimated that an equal number has been dismissed from each of the other departments, making in all about 500 men. There was a scarcity of work.

The stockholders of the Hecla Iron Works, Brooklyn, have agreed to a friendly court proceeding for dissolution of the partnership between Niels Poulson, president, Charles M. Egar and B. T. J. Eiles. This will be accomplished by the appointment of a receiver.

Plant of the Sharon Foundry Co.

To supply the constantly increasing demand for castings for the rolling mills and steel works in the Sharon, Pa., district, the foundry of the Sharon Foundry Co., Wheatland, Pa., was erected, and the plant was started last summer. As all this work is large and heavy there is no bench molding in the plant, all being floor work.

The foundry is 450 feet long and 120 feet wide, the center span being 60 feet in width with two 30-foot lean-tos. The machine and blacksmith shops are also located in this building, as well as the cleaning room. The machine shop is divided off from the remainder of the plant by a sheet iron partition, which prevents the collection of dust and particles of sand and iron on the machines. The machine and blacksmith shop occupy a space 100 x 120 feet. A craneway, supporting three 20-ton electric cranes, extends the entire length of the plant and 75 feet outside, making a total length of 525 feet. It is 32 feet from the top of rail to the ground. The extension outside of the plant is for the purpose of loading heavy castings on to cars from the foundry and for handling stored material in and out. The crane passes through a swing door, 60 feet long and 8 feet wide, which is operated by an electric motor. The cranes on the center span pass through a door similarly operated into the machine shop, and when a crane has passed through into the latter department the door is immediately lowered to keep out sand and dust.

FIG. 1.—PLANT OF THE SHARON FOUNDRY CO., AT WHEATLAND, PA.

The building is well provided with windows, the darkest corner of the plant being furnished plenty of light. Two rows of lifting windows each containing 30 lights extend the entire length of the lean-tos, while sliding windows each containing 35 lights, extend the entire length of the plant from the top of one lean-to to the height of the center span columns. Two rows of pivoted windows each containing 20 lights extend the entire length of the building in the roof. The front of the building contains 92 windows and the rear 24.

One of the lean-tos contains a craneway 275 feet long on which is operated a 5-ton crane, while the other lean-to on the cupola side of the foundry in which the smaller floor work is done is 200 feet long. The iron is melted in two cupolas, one having a melting capacity of 15 tons an hour and the other 20 tons. Blast is furnished by two Sturtevant blowers, motor driven. Scrap, coke, pig iron and fluxing materials are carried to the cupola charging floor by means of an electric elevator, all charges being made up on this floor. Parallel to the foundry is a trestle from which all material is unloaded in close proximity to the elevator leading to the cupola charging floor. Three core ovens are provided for drying the cores, two of them 10 x 10 x 20 and the third 8 x 10 x 20. The two larger ovens are double.

The machine shop is well provided with lathes, planers, drills, boring mills, etc., for the machining of all castings made in the foundry. The power plant is a brick structure, 40 x 40 feet and contains Wheeler vertical water tube boilers of 400-h. p. capacity, a 300-h. p. Erie City engine direct connected to a 200-k. w. Keystone generator. A two-story pattern shop 50 x 150 feet, contains a complete wood-working lay out, patterns being made on the first, while the second story is used for storage purposes.

The plant is on a site of 25 acres, excellently located with regard to shipping facilities. Two side tracks lead into the stock yard, while a third spur runs into the foundry. Connections are thus made with the Pennsylvania railroad, Lake Shore, Baltimore & Ohio, Erie and Pittsburg & Lake Erie. The company is capitalized at $250,000. Joseph Riddle is president, and Thomas Kennedy secretary and treasurer.

Patents for Pipe Making Purchased.

President George B. Hayes, of the United States Cast Iron Pipe & Foundry Co., has issued a statement to stockholders of the company as follows:

"The litigation in which the company has recently been engaged with Andrew H. McNeal, one of its former officers and resident managers, has been terminated by the company's paying Mr. McNeal $20,000 for a perpetual license to use all of his patents relating to the pipe-making and foundry business in all of its plants, and for a release of the claims made against it by him in several other suits. Mr. McNeal was offered this sum for the use of his patents alone prior to the institution of these suits, but then refused to accept it. The suit instituted in June last by Mr. McNeal for the appointment of a receiver for the company was brought to aid him in the prosecution of the suits which have been settled, and has been voluntarily withdrawn by Mr. McNeal."

The Armstrong Machine & Well Works Co., Welsh, La., recently incorporated, has just closed a deal by which it gets control of the Welsh Machine & Well Works Co. Ltd. The company will carry on the same business as its predecessor with the same rating and capital stock. The old company's plant, destroyed by fire recently, will be replaced by a larger fireproof building. The contract for the new plant has been let, also for the machinery. The company expects to be ready for business within the next 60 days. Its members are John W. Armstrong, of Welsh, La., who was general manager of the old company; J. C. Armstrong, of Crowley, La., and J. P. Nicholas, of Fenton, La.

President Bayley, of the William Bayley & Sons Foundry Co., Milwaukee, Wis., states that the recent increase of the capital stock of the company was not made with the intention of building at present.

Freight traffic through the Soo canals in 1903 shows a decrease of 947,112 tons compared with last year, in spite of the increase in coal and grain, the total this year being 34,117,239 net tons.

Annual Meeting of the American Society of Mechanical Engineers.

The New York meeting of the American Society of Mechanical Engineers was most successful from several points of view. The attendance, according to the actual registration of members and guests, reached a total of 826 at the opening of the last session on Friday. There was no lack of entertaining features and the machinery of the meeting moved smoothly under the adroit control of President Dodge. A novelty was tried in the shape of name-bearing lapel cards—a tag with the member's name being worn with the numbered badge. The name plate made it unnecessary in chance meetings to consult the printed list and there was not the annoyance of searching for a name with number higher than that of the printed list on hand. The scheme worked well and with more distinct lettering might even be improved.

The address of the president on the "Money Value of Technical Training" was given in *The Iron Trade Review* of Dec. 3 and as stated last week the president indicated that compliance impressed them as having a keen desire to erect an adequate monument to engineering.

The new constitution, by-laws and rules as submitted at Saratoga were declared adopted and immediately in force.

Prof. John E. Sweet at the request of the chairman, escorted Ambrose Swasey, president-elect, to the platform and introduced him. Mr. Swasey in tendering his thanks to the members for the honor bestowed, mentioned a visit of Prof. Sweet to Hartford about the time of the formation of the society. He rehearsed the conversation in reference to the probable future of the society, the earlier members and his application for membership.

Specifications for Steel Castings, Boiler Plates, etc.

The committee on specifications for boiler plate, rivet steel, steel castings and steel forgings, was represented by Prof. Spangler who gave practically a report of progress. In accordance with his suggestion the report, after some discus-

FIG. 2.—VIEW OF FOUNDRY INTERIOR.

his figures were based upon 70 to 80 instances of each of the four classes cited—the laborer, the apprentice, the trade school graduate and the technical graduate.

BUSINESS SESSION.

Owing to the limited size of the society's auditorium, the session on Wednesday, Dec. 2, was held in the hall of the Mendelssohn Union. This was the business session of the annual meeting and the reports of the council, tellers and committees were received. C. W. Hunt and John C. Kafer gave some account of the progress so far made with the Carnegie gift for the erection of a union engineering building and the committee will prepare for distribution a complete statement of the history of the undertaking to date. The other societies are taking action upon the question and their needs are being determined for the benefit of the architects so that as little delay as possible may follow the acquisition of the site. The property has been purchased and the preliminary estimates made. The figures were somewhat in excess of the amount promised but the donor was not surprised and intimated his willingness to meet the requirement. The committee was much pleased with the outcome and Mr. Carnegie with his cheerful

sion, was referred for further consideration to Committee No. 1 of the American Society for Testing Materials. Prof. Spangler pointed out what he considered the narrow limits of the field under survey. There was some difference between steel of from 40,000 to 85,000 pounds tensile strength, such as was covered by the specifications, and other steel. Commenting further upon some of the criticisms already advanced he was of the opinion that when the physical and chemical requirements were met the steel would have two-thirds of the ultimate strength.

Wm. Kent submitted a translation of the metric measurements of the standard test pieces to English units. W. W. Dingee offered the rivet specifications of the J. I. Case Threshing Machine Co., of Racine, Wis., for the favorable action of the committee.

Prof. R. C. Carpenter was in favor of the retention of the yield point determination. He believed that it would lead to more care by manufacturers and more accurate results would come from that care. An extended survey of the report was given by Gus. C. Henning. He found the specifications not only ambiguous in very important details but a

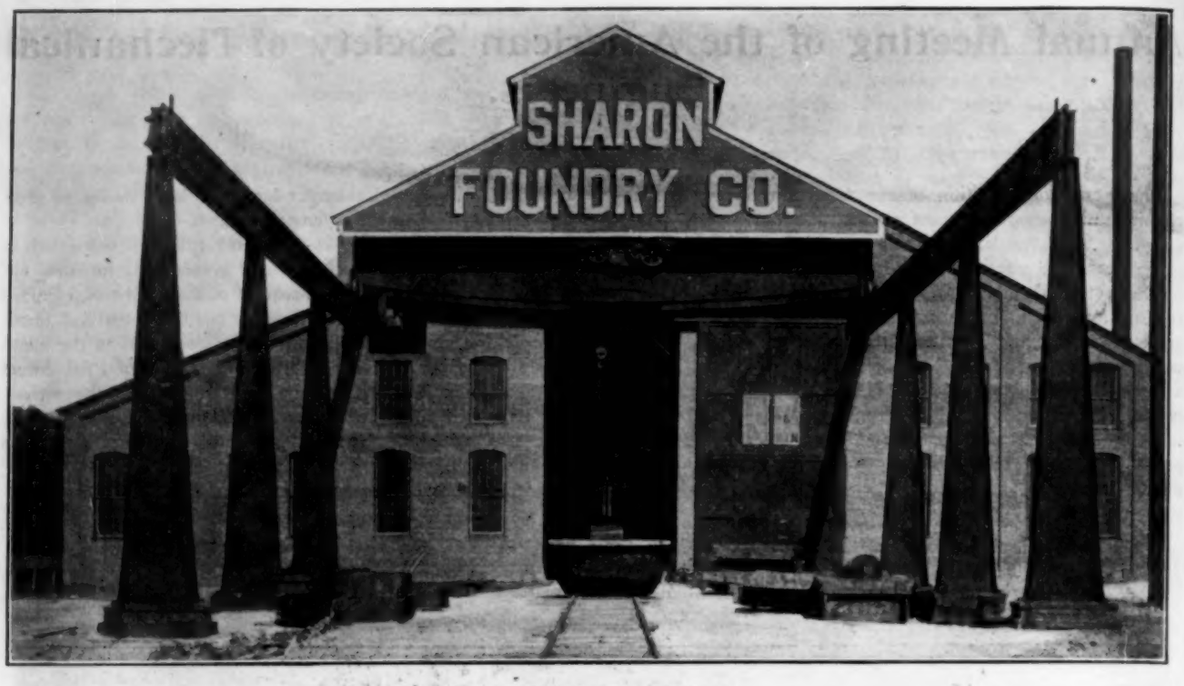


FIG. 3.—THE CRANE EXTENSION.

number of them positively impracticable. He presented a spirited argument in favor of retaining the determination of the yield point as involving no complicated routine in actual practice and at the same time as giving data of the highest importance to engineers. His discussion of the specifications was thorough and to be well understood would require to be accompanied by the temporary report of the committee.

H. H. Suplee advocated the preparation of some formal record and memorial of the twenty-five years' history to be completed two years hence. He had found by experience with other societies that records are often meager. There was however some excellent material in the first volume of the transactions of the society. C. W. Hunt hoped that the committee would incorporate an account of the collection in the rooms of the society. The Erickson picture and its acquisition for the society by Prof. Hutton, also the history of the material relative to Fulton, etc., would be most interesting. The motion for the appointment of a committee was adopted, and at a later session President Dodge named John E. Sweet, Chas. W. Hunt and H. H. Suplee as the committee.

"Is Anything the Matter with Piece Work?"

Frank Richards, of New York, presented a paper under the above title, and with it an introduction of some length. The introduction is as follows:

My little paper is intended to commend and to recommend the straight line in dealing with the workman in the shop. As to that the paper may be left to take care of itself. The matter treated of is but a single factor in a vast and intricate and unending problem; and the mistake too common is in considering that factor alone. What we really want is not merely the adjustment of the wage to fairly compensate for the work done, but to so arrange the payment that it shall be also the best possible stimulant or incentive to the doing of still more, even to the utmost.

It is a curious state of affairs which now exists in these United States among those who ostensibly are seeking to promote our industrial efficiencies. We have at last and only lately fairly and fully taken our measure as producers in comparison with the other and the older nations of the earth, and we have been congratulating ourselves over the indisputable evidences of our ability. In extensive lines of manufacture we are in the lead to stay. There are vast numbers of things which all the world wants, that we can make more cheaply and better than can anybody else. Industrially we

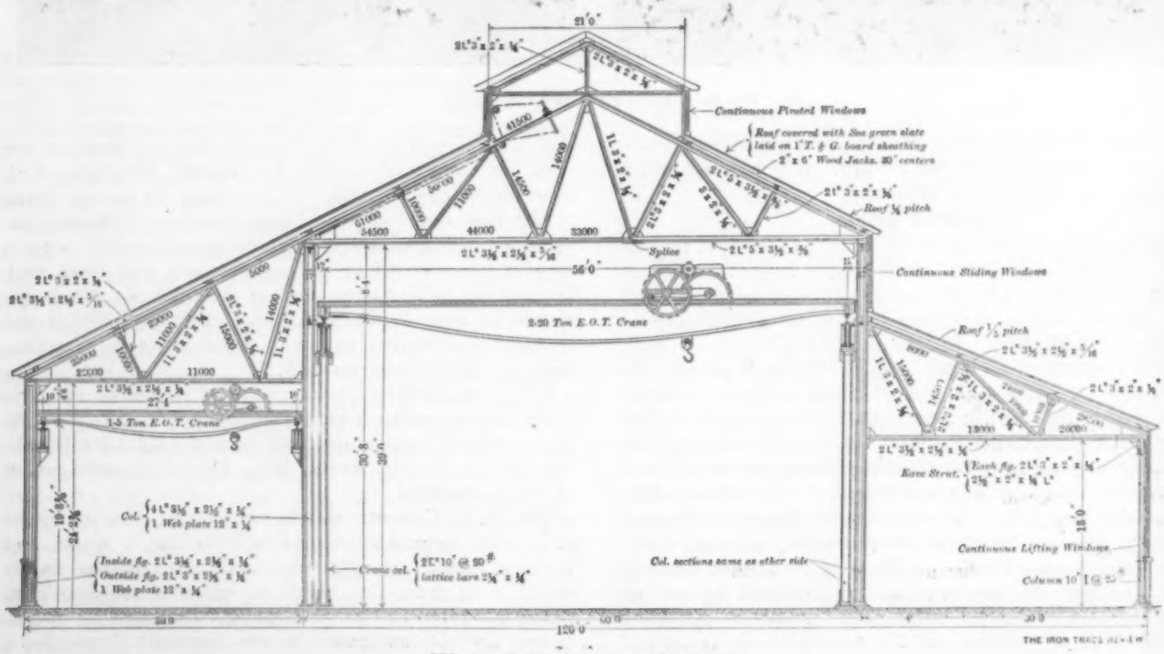


FIG. 4.—CROSS SECTION OF FOUNDRY.

have been playing a winning game; so much so that Great Britain and Germany and the rest of them are inquiring how we have done it and are trying to catch on to our means and methods.

The most natural and proper thing for us to do would seem to be to keep right on in the way in which we have been going rather than to be switching out of it. Instead of changing our methods we should rather try to improve them as they stand by first ascertaining what have been the special conditions and practices which have proved thus far most advantageous and helpful to us, and then by arranging for the further development of these approved methods of success along the same successful and familiar lines.

The strange thing is that this is precisely what we lately have not been doing. There is an American way, and it has been and still is a good way for us, yet those who are now assuming to plan our future for us, who are scheming to pilot our industrial craft, are proposing to turn us out of the good and proved way and to guide and urge us along paths which are strange to us.

We may turn our attention a little more specifically to the winning American way. When we buy a machine tool, an engine lathe, a planer, a milling machine, a turret lathe or what not—we very properly consider in detail each separate movement of the machine and the devices and arrangements by which they are produced. In developing and improving the machine we think nothing so minute and insignificant that a change in it may not be to the advantage of the machine as a whole, and tend to the increase of its output. We certainly do not forget the chief and general function of the machine as the applier of force and motion to the accomplishment of some predetermined and desirable result. We therefore above all see to it that its drive is sufficient for it. The machine has its driving pulley, its shafts and its gears, and we assure ourselves that these are of adequate dimensions. There is nothing so essential as that at the beginning of operations the machine shall take and shall transmit into itself all the power that will be required to drive it to its full capacity. No accuracy and reliability in the delicate movements of the machine will be of any avail if the machine will not go. If it runs only at half speed, or intermittently or unsteadily on account of inadequate driving power its work can never be fully satisfactory.

Now, the man who is to operate the machine, or the man who still has some things to do which no machine has yet been contrived to do for us, the skilled worker, as we call him, is in some respects fairly comparable with the machine, and no one need be offended by the comparison. The man must be able to do something, just as the machine is able to do something, by the interaction of his constituent parts. In the machine the parts are usually of iron or steel, working together or so related that one moves another; in the man it is the bones and muscles which do the work, with the co-operation of eye and ear and all the senses, and with the blood and the nerves as the transmitters of the power from the brain which dominates the whole. No more in the man than in the machine can the drive be ignored. Indeed, in the man much more than in the machine is the drive the most essential element. No matter how fine may be the skill, how facile and rapid the execution, there must be in the man motive and impulse, just as in the machine there must be the rotative force transmitted to it by the belt. The excellence of the American workman, his superior and more prolific accomplishment as such, his persistency in devising better ways of doing things and in finding many more things to do, his self development often into the planner for and the driver of others, have been due to the way in which, and to the power by which he has himself been driven. The failure of engineers to recognize that the drive of the man is at best as important as his lubrication and adjustment is the mistake of the time.

And how has the American workman heretofore been driven? He works for money ,ust as do the men of other lands, and yet we know that after all none of them work for the money, but for what the money commands. The conditions in our favored land have been such that here the man has been able to earn more money than elsewhere, but that does not account for it. He has been a better buyer with his money. He has been able to get more of the good things of life with his money. He has known more of what good things are purchasable with money and has planned and worked to get them. He has been a saver of money to spend it and not to gloat over the mere figures of it. He has been a buyer of homes, an educator of his children, starting them upon higher planes of life than his own, or he has found the way of applying his earnings to lifting himself first into the small independent worker and then into the employer of others. Life has been more worth the living for him than for the workers of other lands. He has not learned content, but his discontent has been of the kind which has led him to willing and planning and working and winning, and not to hopelessness and indolence. He has not been a voluntary loser of time and he has not been given to dissipation simply because he has not been able to afford it, because he has always planned ahead wise and rational uses for all his earnings. His education, not merely that of the public schools, but of his surroundings, his atmosphere, has been his driver.

It is a most unmechanical proposition, a complete ignoring of the relation and sequence of causes and effects, to assume that any one is to be only a skilled or an unskilled worker in a factory and that therefore he does not need much of a general education. We as Americans have not heretofore thought

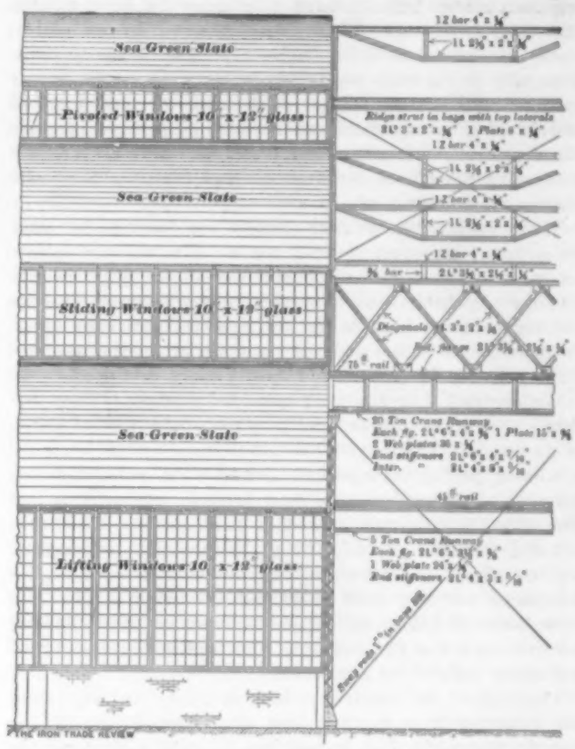

Sea Green Slate
Pivoted Windows 10" x 12" glass
Sea Green Slate
Sliding Windows 10" x 12" glass
Sea Green Slate
Lifting Windows 10" x 12" glass
THE IRON TRADE REVIEW

FIG. 5.—ELEVATION AND SECTION AT CENTER OF FRAMING.

of our boys, nor have we taught them to think of themselves as at best only the skilled workers of the future, but as the future all around men and citizens, and every one all his life to be an understudy for some position above him. The general rather than the specialized education of the masses has been the supreme secret of American success thus far, and our failure to appreciate this has led to gloomy forebodings as to our future and to serious mistakes in planning our industrial career and in providing the agencies for its best promotion.

In the midst of our well warranted self-gratulation, when our workers are most numerous, most skillful, most successful, we are told that skill is dying out, that skilled workers are becoming scarce, that soon, as things are going, we will be left in the lurch by reason of our lack both of competent operations and of the higher skill and judgment and reliability which are to exercise supervision and to have responsibility.

Professional educators, who very properly would magnify their calling and extend their field of work, are, as my ob-

servation suggests, much more exercised over the assumed exigencies of the situation than shop proprietors and managers are. There is, and very properly, a dying out of the skill which we now have little use for, but that counts for nothing; and then we cannot expect a constantly full supply of even the skill that is most needed in the face of a widely varying demand. In the extreme fluctuations of business there come times when everybody is busy, and then of course there will be found shop foremen and superintendents who will complain a little about the difficulty of finding at once the right man for every job, and this is precisely as it should be. Surely no one wants, in the times which are not so booming, to have a lot of skilled men standing idle because no man can find a place for them, and when the slack times come the same foremen and superintendents want as little as possible of that toughest of all jobs, telling good men that there is nothing for them to do. While the demand for skilled labor fluctuates so widely, there being sometimes double the number of workers required as at others, the periods of depression often extending over considerable periods of time, it should not be expected that the full supply for the greater demand can be always and instantly ready. So far as the demand is constant and reliable the supply is not likely to be inadequate.

I have been in the habit of asking in the various shops that I have looked into from time to time about the matter of securing satisfactory help. I have very generally been assured that there is no such difficulty as is assumed by the professional educators and their coadjutor philanthropists to exist. Especially in the many isolated manufacturing establishments scattered through the various small towns of New England and in other parts, where one concern, or perhaps two, are the dominating interests of the place, they have no difficulty in keeping filled with excellent workers from the boys who emerge from the top of the local schools.

Many manufacturing establishment are leaving the large cities and locating in isolated towns. The mistake usually made is in not going far enough. Get as far from the city and the city habits and influences as possible, and then let the big concerns keep as far as possible from each other. In this way the best supply of the material for the most reliable help can be secured and most rapidly developed.

We are told that you can't get good foremen. They evidently are not in such demand as some would have us think. If we wanted so badly either to get them or to hold them we would be paying them more. Consider the value and importance of the services of a good foreman, especially as evidenced in the difference between a good one and a bad one, and then consider the salary and the incidental inducements that are offered to foremen to hold them in that line for a life occupation, and they can't be wanted so much after all. Pay them better and there will be not so many of them climbing out over the top of the trade into other and more renumerative and more satisfactory employment.

The trick of the quack is a false diagnosis, and the wider the diagnosis from the fact that more absurd may be the remedy proposed. The transactions of this society contain nothing more outrageously at war with sane shop methods than the suggestion of the divided (or is it the multiplied?) foremanship; and yet it fits the premise well. So, if we accept the assumption of the incompetence, the unreliability, the dishonesty—euphemistically characterized as "sojering"—of the American workman, the proposition to tell him in every detail how he shall do every job and how long a time he shall take in the doing of it is perfectly legitimate. Yet there is nothing surer concerning the progress of American industries than that in the long run the finders out of how to do things are those who have the doing of them, if they work under the full and the freely operative incentive. Quacks can always tell you of the wonders wrought by their nostrums, and so it is proper that we should hear of the magic changes wrought by industrial quacks in the places where they tarry not too long. Quacks usually are not lacking in impudence. When I was told at the meeting of this society a year ago, by one person speaking for two, that if I had read what they had written my paper would not have appeared, the utterance would have been perfectly natural and consistent if it had emanated from a quack.

I would like to tell of a place where quackery finds scant opportunity and yet where healthy business flourishes. A week or two ago I was in the West Albany shops of the New York Central railroad. They have only a single foreman there and they have to get along with him as well as they can. They have also at a boring mill there a loyal, educated, young American workman, a workman who belongs to the union whose leading motto is: "Whatsoever thy hand findeth to do do it with thy might." This young man has found out for himself how to do what he is doing and he has been his own pacemaker. He is boring steel tires for locomotive driving wheels. The tires come to the works roughly bored and turned. He bores them ¼ inch to ⅜ inch larger in diameter, and he bores them accurately to gauge so that they will be just right for shrinking on when the wheel centers are turned to their gauge. He is boring 44-inch tires, which are about 6 inches wide, in 24 minutes each for the whole day's work. This time includes the placing upon the machine, the setting and the taking off when finished. He has bored 25 wheels in 9½ hour, which is less than 23 minutes each for the whole time. He has four helpers and he keeps them busy the whole time either at the machine or in bringing forward and in stowing away the tires.

I need not tell the shopmen who are here how long it should take to bore the babbitted boxes for car axles. They are 5¾ inches in diameter in the bore with a portion cut away at each side, leaving about 120 degrees in each half box to be bored. They have usually kept two lathes going on this job, and they have had hard work to keep up with the demand. Now the time taken for this job is sixty seconds, one minute, for each half box, and that gait is kept up as long as the supply of the boxes lasts. I saw one box done in forty-five seconds, and it was done by a boy at that. If we are going to quicken shop practice I would suggest that this shop would be a good place to begin.

The young man whom I saw boring the tires has a good general education. He not only has learned to read but he is a reader, a collector and absorber of information on his own account. He is also a talker and a writer. He is able to tell the story of the boring of the tires in a style which would be acceptable in the pages of the best technical journal of the day or in the published transactions of this society.

The thing for us to do is to encourage and not to discourage this general education, to get our raw material of which we are to make workmen with as much mental alertness as possible to begin with. The ideal foundation for the loyal, intelligent, alert American workman is the young man with those characteristics. Trade schools will doubtless do something for the embryo workman, but mostly by supplying a substitute for the general education which is lacking. The trade schools will show the greatest relative improvement in the scholars in whom the general education has been most effective. Nowhere else are such gratifying results to be shown as in the Hebrew trade schools in this city for Russian and Polish boys.

When you get your good workmen pay them by the straight line. Pay them for what they do and for all that they do, and at an equal rate for all that is done. Have no maximum and no minimum limit to men's earnings.

There is a step beyond this which we will sometime take. We will not only accurately proportion the wage to the work done but we will also recognize and make adjustments to compensate for the changing values, or the fluctuations in the purchasing power of money, so that the workman will be able to look upon the times of advancing prosperity and of rising prices when they occur without regret or apprehension. On this point we have perhaps the best adviser in the world. Andrew Carnegie has done his greatest beneficence not as the giver of libraries, not as the builder of a grand house for American engineers, but, while perhaps seeking mostly and of course strenuously his personal gain, as the founder of industries, the maker of work for those who could never have provided it for themselves, and none is better fitted and none has a better right to advise today in the matter of wage adjustment. Here are the words of Andrew Carnegie: "If I were asked what was the best service the Carnegie Co. was ever able to render the wage-earner, next to giving steady

employment at wages equal to any, I should answer, by persuading them to adopt the sliding scale, with a minimum insuring living wages at its works at Braddock 15 years ago."

Mr. Richards' Paper.

The paper itself, to which the above is the introduction, is as follows:

The title of this paper, if perhaps slangy in form is not so in fact, and is, I think, fairly characteristic of what follows. It may be frankly stated that the purpose is not so much to convey information as it is to provoke discussion and to accumulate knowledge upon one of the unsettled questions and one of the most important which can engage the attention of this society. It is also one which can most affect the interests of its members and of those most interested with them in the safe and successful conduct of business. A perfunctory "sitting down" upon the paper is not all that any one could properly desire and cannot possibly close the case.

Attention is invited to the accompanying diagram, which is easily understood. The purpose of it is to show the actual earnings of the workman, and of course also the labor-cost to the employer, for any given amount of work done under either day work or piece work at different rates, the Rowan premium system and Mr. Halsey's premium plan. The amount of work done is represented by the lengths of the horizontal lines and the wages paid are represented by the vertical lines.

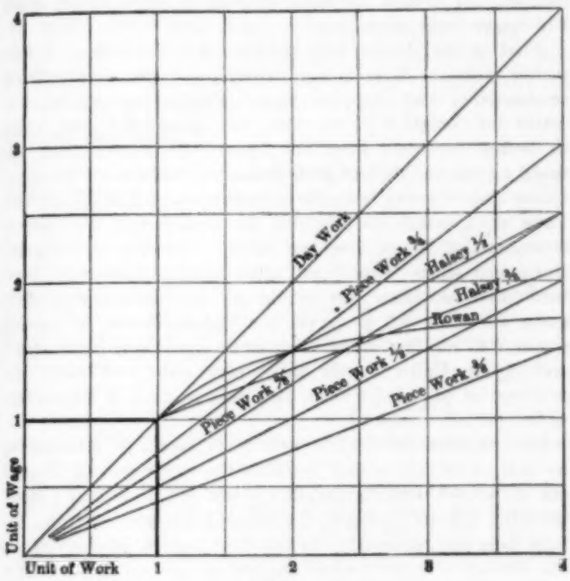


FIG. 1.

As the Rowan system is not in use in this country all may not understand its basis of computation. It starts with a fair day's work, although that may not be the term used to designate it. The unit assumed is the amount or quantity of work which the man should ordinarily be expected to do in a day for the ordinary day's wage, without any special inducement. The premium is earned only by the work which is done in excess of the regular day's work, and the premium earned is according to the time saved in doing the work. If double the work is done in the given time then one-half the time is saved and the man is paid one-half in addition to his regular wages. If the man does one and a half times his day's work then one-third of the time is saved and he is paid one-third more than his day's wages, and so on. The basis of computation is thus fixed and cannot be juggled with, but the inducement constantly decreases with the amount of work done, so that whatever a man may do he can never by any possibility double his earnings.

Referring to the diagram it will be seen that both day work and piece work, whatever the rate of the latter, are represented throughout by straight lines. A discouragement curve represents the Rowan premium system and Mr. Halsey's premium plan has a bend sinister. It was impossible to include Mr. Gantt's bonus system in the diagram because a part of it, the part where you do not quite earn the bonus, must be represented by an *invisible* line.

It cannot fail to strike the observer at once that in the premium plan the work which is done in the earning of the premium is straight, absolute piece work. The name cannot disguise it. The line in the diagram for the premium plan at one-half rate is exactly parallel to the half rate piece work line, the wages earned rise equally in each with equal increments of work done. So the three-eighth premium rate is parallel to the three-eighth piece work rate, and so on. If in making the premium plan bargain, the proposition were made to the man to first do his allotted quota and be credited with his day's wages and that then he should go to work by the piece for the remainder of the day at one-half the day rate, that would be the premium plan in every particular.

The partial piece-work character of the premium plan being undeniable, a paper whose topic is piece work must claim the right to handle it freely and without apology. The premium plan was invented by its originator nineteen years ago; it was put in operation in the shop at Sherbrooke, Can., thirteen years ago, and was first brought to the notice of this society in a paper twelve years ago. The plan, I know, has been proposed and advocated in all honesty of purpose; it has been pushed with earnestness and persistency. As a result the premium plan is in operation in a few machine shops and nowhere else. I venture the personal opinion, based on the fullest available information, that perhaps two percent of the machine work in the United States is done under the premium plan, while ten times as much is done by undisguised piece work and much more than half is still done by the day.

It is not at all apparent that there are any peculiar conditions in the machine shop which demand any different plans of wage adjustment than are prevalent in the other trades While a knowledge of the premium plan is now widespread, the plan has not made itself appear so good a thing that any of the other trades have taken it up. It would not work with the shoemakers of Lynn, the hatters of Danbury, the glovemakers of Gloversville, or the stitchers and starchers in the collar shops of Troy, for they all work by the piece, as do most of the manufacturing trades, and the ultimate possibilities of economical production are thereby secured as completely as they can ever be claimed to be under the premium plan.

We might by an effort imagine the effect of proposing the premium plan to one of the trades outside the machine shop. Let it be tried on a lot of bricklayers. Say that it is first agreed that the day's wages are earned when 500 bricks are laid, and that the premium plan begins right there. The bald proposition is, first, that if 500 bricks are laid 500 bricks will be paid for. This is so far meant to be an honest bargain on both sides. If you don't lay another brick above the 500 we will have no cause of complaint. Well, now, having agreed to pay for the laying of the 500 bricks, when the 500 bricks are laid go on and lay as many more as you can. If you lay 750 bricks we will pay you for laying 625 bricks. If you lay 1,000 bricks we will pay you for laying 750 bricks, and so on. It will be very plain that nuder this arrangement the workmen are clearly the gainers, for if you lay more bricks you get some more money, and every additional cent you get is, of course, clear gain to you. The absurdity of this thing, when dealing with bricklayers, is sufficiently evident. Are machinists so vastly different from bricklayers?

They must be different or else there are some things about the premium plan upon which I need information, and I take this way to get it. One of the inherent and inseparable conditions of the scheme would seem to be the voluntary acceptance of it by the individual workman. It depends entirely upon himself how much the man shall do after the allotted amount for the day's work is done. He may do much or he may do little, and therefore if he so chooses he may do none at all, but just be content to work along at his usual rate and just earn his day's wages. The premium plan as I understand it is ostensibly, entirely a coaxing and not at all a driving plan; and yet it is a matter of common knowledge that in the State of New York alone there have been two determined strikes against the premium plan in the past year. This seems odd. If you don't choose to do what you are formally and distinctly allowed to choose whether you will do or not, what possibility for a strike can there be in that? Can it be that premium plan enthusiasts sometimes venture to

put on to the plan some features which do not belong to it? I cannot imagine any other way in which a strike could be possible.

If they can tag things on and objectionably modify the premium plan they can also knock things off. The one essential safeguard of the premium plan continually insisted upon is that there shall be no cutting of rates when once established. This must inevitably involve injustice, because prices both of labor and of finished products change continually, and there must be, if justice is to prevail, sometimes a cutting of rates and sometimes an advance of rates. So far as it is possible to fix honest prices, and to maintain them there, as long as it is just to both sides to do so, it can be done as well with straight piece work as with any premium plan, and is so done. For instance, I have knowledge of an establishment in the machine line, whose identity I must not disclose, where 1,500 men are employed and where piece work prevails in all departments, so that 90 percent of the productive work of the entire establishment is done by piece work, and it may be said of that establishment that there is no cutting of rates there, just as truly as I suppose it is ever said of works where the premium plan is in use. All prices when made run for a year. They are not arbitrarily imposed by the employer or his representatives, but are the outcome of fair and free and friendly conference, and when changes of price are imperative they are adjusted again in the same way. The works are prosperous continually, and the relation of employers and employes are less strained than they were under other arrangements.

It must be evident that none of these premiums or bonus, or other curved or bent, or defective line schemes, whatever they may claim in the way of quickening the pace of the worker and increasing the output, can be the most effective, for the reason that they offer a reduced incentive at the precise time when the need of incentive is most urgent. It is the last piece done which comes the hardest, and it is absurd to offer the man half-price or less for doing it. With either of the premium plans doing its best in the way of increased output and reduced labor cost per unit, and with piece-work prices adjusted to precisely the same price per piece, the inducement to the worker to increase his output still further must be greater under the piece work than under the premium plan. The guarantee that prices shall not be cut is precisely as applicable to piece work as to the premium plan. The latter has absolutely no monopoly of honesty, no assurance of price maintenance any more than the other. With equal temptation to cut, and with the same human nature in the boss, the chances of cutting will average precisely equal.

With no one having the slightest interest in pushing or advertising piece work, it is advancing on its merits as the most honest way of paying for repetitive work in the machine trade as in all others. It is worth while to note its popularity and progress especially in the extensive line of railroad work. The testimony at the meetings of the various railroad organizations is very pronounced in this direction. At the meeting this summer of the Railroad Master Blacksmiths one man stated that absolutely every job in his shop was done by the piece. When the price could not be placed on the work to be done it was placed on the "heat." Perhaps it may not always be possible to do this in the machine shop, but whenever the opportunity arises to consider the mode of payment it should always be in order to ask: What's the matter with piece work?

Discussion.

Harrington Emerson prefaced the discussion he had hurriedly prepared on the train, by stating that he had held a stop watch on the previous speaker and found that Mr. Richards had greatly exceeded the time limit set for the job. Something in the line of functional foremanship might have been of advantage therefore in that instance. Mr. Emerson then submitted the following:

Just two years ago I was fortunate enough to have Mr. F. W. Taylor explain to me his principles of shop directions and the results that he had obtained. It is Mr. Taylor's great merit that he first applied these principles to machine shops, but they are as old as humanity, and consist in setting a definite task, in directing its execution and in apportioning the reward according to the deed. Thirty years ago I made my first acquaintance with these methods in the strictest of strict German schools, where we were put under functional teachers, ten or twelve different men each day, where we were allotted to the peculiar classes for which our uneven attainments fitted us: one boy in the highest English and lowest mathematics, his twin brother perhaps in highest mathematics and medium English, where our methods, books, appliances, hours were strictly planned for us, our tasks set up to the full limit of our capacity, and where we were rewarded as individuals, not as members of a class. In the middle of the term a boy might be either promoted or debased, yet it was open to each to secure the same highest marks, and with the marks much prized rewards and special privileges. The results in that school were astonishing. The great majority of the boys learned more in 18 months than other schools could teach in 4 years, because there was no waste time, no waste process, no waste effort; it was time unit study, functional foremanship and differential piece work.

At our meeting in Saratoga this year, Mr. Taylor presented in printed form a full statement of his fundamental principles, and, in my estimation, it will be many years before anything of more than detail value can be added to his work. My copy of his book is worn out with thumbing of the leaves, and marking of important passages. I discovered that it would have been easier to mark the few sentences here and there that were not of prime importance; yet, for our fellow-member, Mr. Frank Richards, it is as if Mr. Taylor's work had never been made public.

What is the matter with piece work? Everything is the matter with it. It is a lazy, haphazard method of shifting responsibility and direction from employer to employe. It works for deception in the latter, and gives us a long string of broken promises from the former; it is hated and opposed by the unions, and with reason; it brought on the great Union Pacific strike last year, which is not yet finally settled. Piece work makes no provision for justice, and any system is wrong that is not based on justice. In some of the great Burlington shops "Novo" and other modern steels have been introduced, doubling the output of the workman without extra effort on his part, yet the superintendent of motive power told me that piece work rates would not be changed, and in the Union Pacific shops men came and asked the privilege of paying for their own modern tools if piece rates would be left unaltered.

The fundamental trouble with piece work, in addition to its lack of justice, is that it makes the workman sell what is not his to sell, namely, output. When Mr. J. J. Hill formulated his famous principle that railroad expenses were by the train mile and receipts by the ton mile, neither his train crews nor himself ever dreamed of putting the pay of the men on a tonnage basis. The engineer who hauls sixty 80,000-pound cars with a 100-ton engine gets no more than the engineer who obeys orders, standing for hours on a side track. The engineer sells his time, his skill, his intelligence, his obedience. but never output, because that depends on conditions over which he has no control; and it has always been a wonder to me that railroads which manage their train problems should be so backward in their machine shop practices and methods.

What the employe sells, whether in office or shop, is not his "output," but primarily his time and his skill, incidentally his intelligence and his obedience. That many shops pay by piece work is no argument in favor of the plan, since more shops pay by day work; and, as Mr. Barth in his slide rule paper presented at this meeting, only too moderately remarks, the usual way of running a machine shop appears little less than absurd.

The experiences of Mr. Taylor, Mr. Gantt, Messrs. Dodge and Day, Mr. Barth, myself and Mr. Parkhurst, who have carefully studied the output and results in innumerable machine shops, prove that the wastes going on are more than absurd. As an example of old practice against new, I hold in my hands the original figures of the skilled and competent engineer of a large shop, who estimated the cost of a certain job at $4.575, $3.300 for materials and $1.275 for labor. The work came under my direction after it was one-third completed and was pulled off with four men in three months for a

total cost of $3,375.09, of which $622.79 was for labor, netting a profit of $1,824.91, instead of $629.00 as estimated—nearly three for one. Yet some of the men on that job were paid a bonus of nearly 100 percent above their regular wages. I also hold a routing card of one of my assistants, Mr. Parkhurst, in which a car shop job, marking and moving 200 pieces of oak, was estimated by the foreman to require two days, but was actually completed in 2 hours, 25 minutes, on a 50 percent bonus basis. This is what Mr. Taylor's methods will do when applied to an old time shop.

In planning jobs of this kind, we pay no attention to what has or is being done. Former practices have absolutely no interest for us. We figure out the time the job ought to take under existing conditions, and we pay the man a generous bonus, which must be enough to call out the best that is in him. If the conditions appertaining to the job are changed, either for better or worse, we again determine the minimum times and pay the man a bonus for his co-operation. These illustrations show that astounding results follow the plans Mr. Richards condemns without understanding them, and that there is no argument whatever in appealing to present practices. Mr. Richards' diagrams and his reasoning and conclusions are erroneous, because he bases them on output, which does not properly enter into the matter at all, as diagrams based on time instantly show. I assume in all cases wages of 25 cents an hour, a usual time 8 hours for a given job, a slow time of 10 hours, a fair time of 6 hours, a piece work time of 5 hours, a Taylor bonus time of 3 hours. Time, days, hours, minutes—in this case hours—are measured on horizontal lines, wages by the week, day, hour or minute—in this case by the hour—are mentioned vertically.

Fig. 1—Day Work.

(a) = slow day (b) = average (c) = fast day under good foreman.

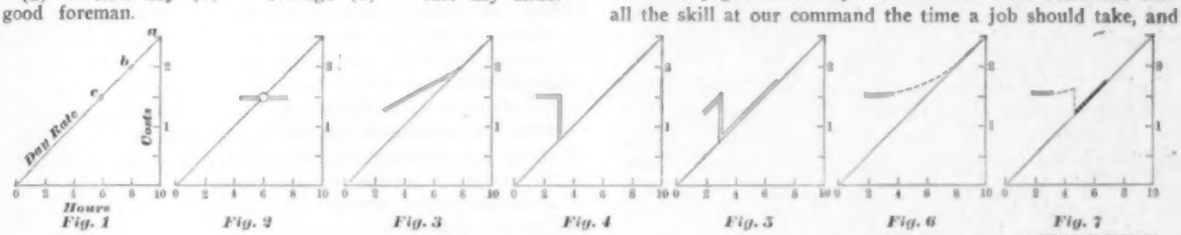


Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig. 6 Fig. 7

TIME UNIT COST DIAGRAMS OF DAY WORK, PIECE WORK, PREMIUM, DIFFERENTIAL PIECE AND VARIOUS BONUS PLANS.

Normal cost 8 hours to employer $2.00, wages per hour 25c.
Slow cost 10 hours to employer $2.50, wages per hour 25c.
Low cost 6 hours to employer $1.50, wages per hour 25c

The employer makes all the gain or loss. He is stimulated to good foremanship and better equipment, but the constant tendency is to deterioration.

Fig. 2.—Piece Work.

Piece work cost at 6 hours, $1.50, wages per hour 25c.
Piece work cost at 8 hours $1.50, wages per hour 18.75c.
Piece work cost at 4 hours $1.50, wages per hour 37.5c.

This is exactly the reverse of day work. The employe makes all the gain or loss, and is afraid to cut time for fear wages will be cut.

Fig. 3.—Halsey Premium.

Cost to employer at 10 hours $2.50, wages per hour 25c.
Cost to employer at 8 hours $2.00, wages per hour 25c.
Cost to employer at 6 hours $1.75, wages per hour 29c.
Cost to employer at 4 hours $1.50, wages per hour 37.5c.

The chief merit of this plan is that it obviates the necessity for change in piece rates. It has worked admirably in certain shops steering a half-way course between the injustice of day work and of piece work, but it is not fitted to cope with the unexpected. If there are no improvements by the employer there is no reason why the employe should not get in full the increased result due to his greater diligence and skill, but if improvement is due to the employer's better equipment there is no justice in giving the employe any part of it.

Fig. 4.—Taylor Differential Piece.

Cost to employer at 3 hours $1.50, wages per hour 50c.
Cost to employer at 2 hours $1.50, wages per hour 75c.
If employe habitually exceeds three hours he is not wanted.

Here for the first time attention is concentrated on the reasonable maximum of production and the reward made proportionately great. Not only is there no attempt made to cut piece work prices, but the reward is withheld unless the maximum is done. The great difference between this and ordinary piece work is that Mr. Taylor demands the payment of a high premium, often 100 percent, a figure that would frighten most employers, in order to effect maximum reduction in cost. If the employer introduces improvements, times are with justice shortened but not the premium per hour; if equipment deteriorates times must be lengthened but the same premium be paid per hour.

Fig. 5.—Gantt Bonus.

Cost to employer at 6 hours $1.50, wages per hour 25c.
Cost to employer at 3 hours $1.50, wages per hour 50c.
Cost to employer at 2 hours $1.25, wages per hour 62.5c.

The difference between the Taylor and Gantt plans is that the former pays by the piece finished in a definite time, while the latter pays by the definite time for a completed job and pays the bonus, not for the piece but for following instructions. Mr. Gantt does not admit that under his system the workman could better the time set and therefore objects to the supposition of two hours on a three-hour job. Mr. Gantt asserts in reply to this diagram that when a workman succeeds in a record of two hours on a three-hour job the time has arrived for the machinist and the rate fixer to exchange places. I extend the diagram theoretically in order to show the difference between Taylor and Gantt. Taylor is more severe and more generous. After careful study of the Taylor and Gantt diagrams, Mr. Parkhurst and myself, adhering absolutely to the Taylor and Gantt theory of time unit study and specific directions of all operations, have used other diagrams, less severe than Taylor and Gantt, and permitting us in an old shop, where tool, machine and labor conditions are not modern, to keep the ideal always in view, yet we reward any gain shown by the workman. We determine with all the skill at our command the time a job should take, and adopt the Taylor line, based however on time and not on piece, and then run back to the day line.

Fig. 6.—Emerson Parabolic.

Cost to employer 10 hours $2.50, wages per hour 25c.
Cost to employer 8 hours $2.00, wages per hour 26c
Cost to employer 6 hours $1.75, wages per hour 29c.
Cost to employer 4 hours $1.50, wages per hour 37.5c.
Cost to employer 3 hours $1.50, wages per hour 50c.
Cost to employer 2 hours $1.50, wages per hour 75c.

Fig. 7.—Parkhurst Combination.

Cost to employer 8 hours $2.00, wages per hour 25c.
Cost to employer 6 hours $1.68, wages per hour 28c.
Cost to employer 4 hours $1.56, wages per hour 39c.
Cost to employer 3 hours $1.50, wages per hour 50c.
Cost to employer 2 hours $1.50, wages per hour 75c.

The essential difference between these diagrams and the Halsey premium line is not that they are curved and it is straight, but that it begins with an accurate and probably justly determined rate and drifts mathematically, but not scientifically, into space. Mr. Parkhurst and myself begin with the scientific maximum of output and reward for endeavor, and, as a mere matter of shop convenience curve backwards to the day rate line. There is no special merit in the parabola or in the straight line, other lines might answer practically as well. The main point is that a little improvement gets a little taste of reward, and a big improvement gets a great big reward.

When all conditions are properly under control, I much prefer the Taylor diagram based on time. There is something inspiriting in working out a minimum time, in knowing that it can be made with the regularity that a train makes its fast schedule, in providing it, in stimulating the workman to it; but it is equally discouraging to workman, to expert

and to employer to be wrecked in full flight by hard iron from the foundry, by variable speed in the engine, by broken belt on main shaft, by any unforeseen and unforeseeable delay, and in such cases the curve back to day rate prevents much trouble.

In all these diagrams, except day rate, the employe is benefited by reduction in time; in all these diagrams, except piece work, the employer is benefited by reduction in time, and reward for reduction in time is apportioned exactly as it should be, only by the Taylor method and its modifications. The employer must pay big bonuses or he cannot get results. He can afford to pay big bonuses, for even if he gives all the gain in time to the employe he makes on increased efficiency of plant and diminished overcharges.

Where, in all these lines and curves, when based on time, is there any support for Mr. Richards' contention that they cannot be effective because, as he claims, they offer a reduced incentive at the precise time when the need of incentive is most urgent. Exactly the contrary is true. They all of them offer, just as piece work does, ever increasing pay, which, if pushed to the theoretical limit, would reduce costs to almost nothing, and give the employe an infinitely large sum per day.

H. L. Gantt said that the West Albany shops of the New York Central Railroad were not any great distance from Schenectady and Mr. Williams and others had followed the work done at the latter place with close attention. He had personally visited the shops at West Albany and had explained the system adopted at Schenectady to those in charge.

Oberlin Smith described the difference between the jobbing shop and the repetition work of straight manufacturing. Day work was probably best for the former and where articles are made in quantities some of the other systems of wage paying should be adopted. Not all shops were in a position to make machines for stock purposes and he would like those who had made a study of the matter to say whether the modern plans were applicable to small batches of work.

Fred W. Taylor asserted that there was no quarrel between the different systems of paying men. Each system has a field that the others cannot fill. Back of all the systems of paying men there is the fundamental matter of management. There were few who knew the value of a day's work, the quantity that a man could do in a given time. He had said one thing a number of times but some present had possibly not heard it. He had laid down for himself that the most important question was the study of time; accurate time study is of more importance than anything else. It was just as important to obtain the correct time on miscellaneous work as on any other. He was of the opinion that each one of the four systems has its proper place in any shop.

E. E. DuBrul told of the mistaken policy tried by a new superintendent who changed the base price on taking control of a plant on the premium plan. The former figure was speedily renewed on the situation being ventilated and harmony was restored. An injudicious act of that kind was of direct injury to other manufacturers and should be promptly condemned. He called the union end of the proposition to the notice of his hearers and gave the tenor of the resolutions adopted at the Milwaukee convention of the International Association of Machinists against the existence of piece or premium work after the commencement of the coming year.

In further reply to the question of Mr. Smith, Mr. Taylor said that the work in the large shop of the Bethlehem Steel Co. was of a very miscellaneous character, the difference between the army and navy types of guns constantly changing patterns and designs.

Modifying Systems of Management.

The paper of H. L. Gantt, of Schenectady, N. Y., on the above subject appeared in our issue of Dec. 3. In discussing it Charles D. Parker inquired about the reward due the foreman. What does he get out of it and how does he like it when the men make as much or more than himself? Mr. Gantt said that at the Bethlehem plant the custom was to give a bonus to the foreman if *all* his workmen earned their bonus, the idea being that the foreman should give his attention to the poorest workman.

Machine Tools of the Future.

Prof. John E. Sweet, president of the Straight Line Engine Co., Syracuse, N. Y., read the following paper under the title, "What are the New Machine Tools to be?"

It is a fact quite apparent to users of machine tools (and first among them are the machine tool builders themselves) that the new high-speed tool steel calls for a re-designing of our machines if we are to get even a fair share of the ultimate possibilities which the new steel offers. I expect the machine tool builders have already the reply formulated as follows: "You just keep on building engines and leave the machine tool business to us." But that will not quite do. If no one but the engine builders had mixed in the engine business, we would have had no turbine engines, and many of the standard machine tools were originally devised by those who had use for them rather than by the man who devised things to sell.

I think the machine tool builders will admit that the machines must be re-designed; but to the most of them will this mean anything but just to make the driving elements more powerful and the machines stronger, which is as much as to say everything has been all right, and all we need to do is to change the strength and power. But have they been all right or half right? It can be shown by figures, I suppose (I know it to be a fact by a trial with models), that a complete box is thirteen times more rigid against torsion and four times more rigid against bending than the same amount of material is in the form of side plates and thin cross girts. It is probably from four to eight times more rigid than the cross girt plan in any form, and yet in the case of lathes, the whole business of whose beds is to resist torsion, only one or two builders have had the courage or audacity to adopt the box form.

All planer beds can just as well be box beds with half the cost in patterns and foundry work, and so too the tables which are sprung by bolting down work can just as well be box tables four times as strong with the same material, and with a saving of half the cost in patterns and something in the foundry. The whole tendency of the cut is to slide the work endwise of the planer bed; but who has ever tried putting the slots crosswise in a way to offer the greater resistance and prevent the bending of the bed by the peening of the upper surface, as now occurs, which with the springing by bolting down the work are the primary causes of cut ways.

Some planer and boring mill cross rails are of box section in the center, but are thinned down at the ends when fastened to the housings. The most of them are three sides of a box only, or one-tenth the strength of a box, where a plain square box straight through is infinitely better and cheaper. Of course the boxes are not to be proportioned from what is in use now, but from what is to be made to meet the new conditions. To select enough material to meet the new demands and then put the material so that it will be four times more rigid will be something like it. Housings of box section will be just as rigid fore and aft and much more rigid against side strain.

Milling machines of the planer style are constructed like planing machines, seemingly without a thought but that the conditions are identical, while they are not. If the bed of a planing machine and the table were of the same length, the weight of the table and the load over-running the end of the bed would soon wear the top of the bed crowning and the under side of the table concave to fit, and it is to counteract this tendency of gravity to wear them out of true that the beds are made longer than the tables. With the milling machine the load is less, more of it in the middle of the table, because there is less gained by putting on small pieces end to end, and the down pressure of the big cutter always in the middle partially, if not wholly, neutralizes the tendency to wear out of true by gravity. When such a machine has side cutters or a vertical spindle, the pressure is always in the middle, first in one direction and then the other, exactly the reverse from the gravity action, and instead of the side guide of the bed being longer than the table it should be shorter, by just about the same amount as the bed of a planer needs to be longer.

Many times the sliding piece and its guides can be the same length and keep straight. The things which do not tend to wear out of true do not wear much, and the things which do wear out of true and have to be refitted are never just right, but when new and when so refitted. Where a short

block slides on a long guide, if the scraper marks wear out sooner along the middle than at the ends, the ends of the guide need cutting off, however much overrun it gives to the sliding block.

The draughtsman dare not make a drawing of an engine cross-head over-running the guide one-third of its length at each end; the builder would hardly dare to build it if he did, and no user has the courage to take out the guides and cut them off or cut away the surface even when he knows it would be money in his pocket, but it is the thing to do. We find that in the case of a slipper guide, owing to the effect of inertia and momentum giving a twisting action to the crosshead, it is necessary to cut away the guide so that the crosshead will over-run very nearly one-half its length before the scraper marks will show uniform wear. This, of course, is subject to modification according as the center of gravity is higher or lower, or the speed of the engine is greater or less. We are building engines with the crossheads over-running that way and people buy them.

To get the best out of machines, they not only want to be rigid and true, but the drive needs to be powerful. In this respect a worm gear is about as perfect as can be, or cutting spur gear teeth spiral accomplishes about the same result. What appears as an objection to spiral teeth is end thrust against the shoulders, which does not amount to much, and when the shaft runs in reverse directions and end play in the journals is permissible, the journals keep in much better condition. The mention of a worm gear is like the flaunting of a red rag to some people, but it has its place and a good many more places than it has been used in. The claimed objection is excessive friction and loss of power, but the results do not seem to justify the claim.

The most perfect worm gear we have (theoretically) is a screw and nut, and they do waste enormously in friction, and in proportion to what they do they wear out the most of any piece of mechanism. The most imperfect worm gear we have (theoretically) is the Seller's planing machine drive, and yet they never wear out, and hence cannot lose much in friction.

In the writer's opinion two of the things which never need to have been invented are the Hindley worm gear and a machine for hobbing worm gear. Experience convinces the writer that a liberal pitch worm skewed round so as to properly mesh with a plain spur gear, or one with the teeth at such an angle as to skew the worm a little more will run more easily and last longer than the other sort. A machine driven with the worm is positive, and if there is any chatter it comes from elasticity in the spindle or the work itself. The value of lathes, particularly those used for face plate work, is considerably improved by having large and short main bearings. They should be large to resist torsion and short to resist bending, and the ordinary face plates are ridiculously frail. To get the best of a face plate it should be box section and as large as will swing in the lathe.

Owing to the rapid wear of screws the writer is convinced that a precision screw in any lathe used in manufacturing is of no special value over a fairly good one. Wearing the screw in one place while threading a few hundred pieces destroys the precision in a way which no future use will ever correct. If the designer will analyze every detail he will find that many of the old features were not right to meet the old conditions and not half right for the new.

While manufacturing is going to call for many more simple machines—that is, machines to do one thing rapidly and well—the machines which will do a variety of work will be still in demand, for the sparsely settled sections of the country and the colonies will call for the country machine shop as of old. It is the hope of the writer that this tirade will bring out an interesting discussion on machine design and the capabilities of the high-speed steel, for that is the object of its presentation.

John D. Riggs said in discussing the paper: "There is no question that there is now a demand for a general redesigning of machine tools, but is this entirely due to the new high speed steels or is it not rather due to the fact that the designs were only half right, and now with the new steels this half right is being reduced to one quarter right. If higher speed is all that is required, this can be done at once in most cases by putting a larger belt on the line shaft, or at most by adding a high speed belt between the line and the countershafts. It may be noted that doubling the speed in this way doubles the available power as well.

"Cone pulleys have gotten into bad repute, largely, I think, on account of having too many steps and too small dimensions.

"Established practice may be given credit for some of the weak points in present machine design. It does not follow that because our grandfathers sawed off the ends of their wooden lathe beds square present day lathe builders should do the same with cast iron ones.

"Again, those builders who *borrow* designs and devote their best efforts to *getting* money do their part in establishing practice.

"In applying the individual electric drive the practice of incorporating the motor into the design seems to be the most commendable. One casting may serve as the frame for both machine and motor and yet the machine may be furnished with or without the motor drive.

"In applying motors to radial drills why not place the motor on the radial arm very close to the drill spindle and thus dispense with a considerable portion of the mechanism now used to transmit power from the stationary shaft?

"The experience of Prof. Sweet with worm gears is certainly quite different from my own. While the Sellers planer drive has proved all right, the ordinary worm gear as used in freight elevators in buildings is not all right. And the worst feature of these machines is that you seldom know how near right they are or when they will go wrong. The lubrication of the two is essentially different. Those people who have labored to improve the worm gear for elevators have my sympathy, but none of my money, as long as the direct hydraulic elevators are in the market."

H. P. Fairchild submitted the following: "Any one who has had much to do with the so-called high speed steels must have been impressed with the fact that the ordinary 15 or 16-inch engine lathe was lacking in material. About one year ago I put in the hands of some of our students tools forged from one of the prominent high speed steels, my object being to study the uses of the steel. The students' instructions were to break down the tool if possible, then to reduce the speed and feed until a desirable balance was reached. At diameters of about two inches the lathes used were not able to make good, and it was necessary to reduce both the feed and speed to prevent seriously injuring the machines. The trouble seemed to be entirely confined to the headstock and carriage and after some study of the subject and continued observation, I came to the conclusion that the most of the trouble was a lack of material in the headstock itself. At the diameters turned a high speed of revolution was needed to bring up the surface speed to the desired point, and to prevent tearing the headstock to pieces a heavy faceplate of a size as large as the lathe could swing was put upon the nose of the spindle. This seemed to correct much of the trouble and I believe is a desirable thing to do, although it is not usual to use a flywheel on an engine lathe. As far as observed the bed was not affected in any case.

"I would suggest that my conclusions are that the engine lathe needs more material in its headstock, broad surfaces in its carriage, nicely gibbed, a positive drive to its feed works, a less number of steps on the cone and broader belts and a massive faceplate."

Fred W. Taylor, in reply to a question, corrected an impression that the high speed steels were necessarily stronger and said that the tungsten and molybdenum steels were weaker than the ordinary crucible steels.

The remaining papers of the program were postponed to the following day and an adjournment was made to the society house for lunch, after which excursions were made to the local power plants and machine shops.

THURSDAY'S SESSION.

Thursday morning the members and guests assembled in the Stevens Institute of Technology at Hoboken, for the presentation of professional papers. The paper submitted by Prof. Jacobus on a "Test of a Compound Engine, using Superheated Steam," called forth some queries in reference to the deterioration of superheaters and their value. The designer of

the engine, R. H. Rice, of the Providence Engineering Co., of Providence, R. I., gave a description of the mechanical details of the engine and superheater and in answer to a question by A. E. Cluett, "What is the highest temperature of superheated steam practicable?" said that temperatures over 500 degrees Fahr. would give trouble. He intimated that there was no definite data on the subject. Prof. Jacobus was equally wary in commenting upon the value of superheater installation in the "present state of the art." There was evidently much to be investigated, but with engines designed for the service there seemed no reason why the superheater should not be worth while from the standpoint of economical operation.

The paper by F. A. Scheffler, "Suggestions for Shop Construction," presented a plan in which the manufacturing buildings radiate from a central space containing the executive departments, analogous to the arrangement of the Eastern Penitentiary of Pennsylvania. The comparison suggested to H. H. Suplee the fact that by means of mirrors the watchman in the center of the penitentiary in question could from the same position look down each of the radiating corridors.

One of the most interesting of the papers was on "Slide Rules for the Machine Shop as a Part of the Taylor System of Management." The paper should have been illustrated by the stereopticon, but a morning session was not favorable to distinct pictures on the screen. This was, however, little or no impediment to the energetic author who made his subject entertaining and instructive. In fact, as stated by B. H. Thwaite, of London, at a later session, there was an exhibition of wit gilded by humor.

Dr. Goldschmidt on Alumino-Thermics.

After lunch a lecture was given by Dr. Hans Goldschmidt, of Essen-Ruhr, Germany, on "Alumino-Thermics and their Application to Engineering and Metallurgy." The lecture was practically identical with the one given at Columbia University and largely presented at the time in *The Iron Trade Review*. The experiments went with smoothness and success. Street railroad rails were welded, holes burnt through 1-inch iron and pipe sections united with surprising ease and workmanlike celerity. The lecturer was frequently given hearty applause and at the close received a rising vote of thanks.

The usual reception in New York took place Thursday evening and gave the accustomed pleasure for the numerous attendants.

FRIDAY'S SESSION.

Friday morning a paper was read by Ralph Morgan on behalf of his father, Charles H. Morgan, of Worcester, Mass. It dealt with a compact gas engine of the beam type. The engine will probably be described in detail in these columns. B. H. Thwaite, of London, could not endorse the view taken by the author of the paper and by H. H. Campbell, of Steelton, Pa., in the latter's book, to the effect that "it is quite possible that the exhaust gases from the gas engine can be profitably employed to heat the blast in the stoves of the blast furnace." The exhaust from a modern gas engine was about 400 degrees and half of that would be of little use for heating stoves. Gas engines were not explosive engines. They were less so than steam engines, a view also taken by Prof. Reeves; and while the old type of gas engine might have been so termed, the more modern designs gave a very gradual increase of the pressure on the shaft. H. H. Suplee supplemented this by explaining that the Otto and Langan gas engine was not explosive when connected positively to the crank, the power transmission to the shaft taking place on the return of the piston.

E. A. Uehling discussed the enormous waste of power at the blast furnace. He believed that 840 h. p. per ton of iron was produced per hour at the furnace and gave interesting figures and facts in reference to blast furnace gases. Both B. H. Thwaite, of London, and Ernest Koerting, of Hanover, designer of the large gas driven blowing engines of the Lackawanna Steel Co., at Buffalo, were invited to present papers later on gas engine practice.

The president announced that Charles B. Mapes, son of Prof. Mapes, an old friend of Capt. John Erickson, had presented a bust of the latter to the society.

Tribute to the Late R. H. Thurston.

The following resolutions had been drafted for the council by C. W. Hunt, John E. Sweet and Jno. Fritz:

"Sudden death has called from us our first president, Dr. Robert H. Thurston, the one of all best known to us through his work for the society; the one of all best known in technical education, and the one of all best known to the engineers of the world.

"His name will last as long as this society lasts, and we who knew him best will hold his name in loving remembrance as long as we live. We mourn him, and to his wife and children, to whom his loss is so much greater, we extend our sincere sympathy.

"God has called to himself one of his noble men; the peer of his associates, and a model for the young men of America. It is such as he who make life worth living. Remembering his greatness, let us try to emulate his virtues."

This closed the business of the meeting, discussion of the topical questions being postponed, and the meeting adjourned.

A visit to the DeLaval Steam Turbine Co.'s shops at Trenton, N. J., was made by special train Friday afternoon and arrangements were also under way for a trip to the Yale & Towne plant at Stamford, Conn., on the same date. At the latter plant a steam turbine of Westinghouse type is working successfully and another one is in process of erection.

THE FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting (the 133d) of the Foundrymen's Association was held at the Manufacturers' Club, in Philadelphia, on Wednesday, Dec. 2, with President Thomas Devlin in the chair. Among those present were the following:

Thos. Devlin, Thos. Devlin Mfg. Co.
E. E. Brown, E. E. Brown & Co.
R. C. Oliphant, Oliphant Steel & Iron Co., Trenton, N. J.
P. D. Wanner, Reading Foundry Co., Reading, Pa.
J. Thompson, J. Thompson & Co.
Geo. Johnston, Ernest Law & Co.
A. C. Groome, Bethlehem Steel Co.
L. S. Roberts, Andrew McClay and Wm. F. Bernstein, Bernstein Mfg. Co.
Jno. R. Lawrence, Jerome Keeley & Co.
Nicholas Mager, Logan Mfg. Co., Phœnixville, Pa.
N. Lillienberg, Carl Setterall & Co., Stockholm, Sweden.
T. B. Harkins, Harkins Foundry Co., Bristol, Pa.
W. A. Perrine, Abram Cox Stove Co.
J. S. Hibbs, J. W. Paxson Co.
C. D. Matthews, Camden Iron Works, Camden, N. J.
H. L. Haldeman, Pulaski Iron Co.
Geo. C. Davis, Official Chemist.
A. A. Miller, *Iron Age*.
C. R. Brown Jr., and A. D. Wallace, E. E. Brown & Co.
W. H. Shelmire Jr., Creswell & Waters Co.
W. J. W. Moore, Pilling & Crane.
F. C. Pullman and K. Sylvester, of J. Wesley Pullman.
H. C. Matlack, Frank Samuel.
J. Henry Pepper, *The Iron Trade Review*.
Edward Hitzeroth, C. Hitzeroth Foundry.
Geo. M. Benkert, G. Rebmann & Co.
J. J. McCrystal, Girard Iron Works.
T. J. Kelley, Thomas Roberts Stevenson Co.
H. O. Evans, Thomas Devlin Mfg. Co.
W. O. Steele, Bateman Mfg. Co., Grenloch, N. J.
F. Von A. Cabeen, Cabeen & Co.
Wm. S. Hallowell, Harrison Safety Boiler Works.
S. G. Flagg Jr., Stanley G. Flagg & Co.
J. S. Robeson, American Glutrose Co., Camden, N. J.
F. C. Price, E. T. Etting.
H. W. Coleman, J. K. Dimmick & Co.
Thos. Holt and Herbert Holt, Camden Foundry Co., Camden, N. J.
W. E. Mack, J. Thompson & Co.
Harry Huder, Schaum & Uhlinger.
A. McKowan, Williamson Bros. Co.
Geo. H. Jefferis and J. Parker Jefferis, Pusey & Jones Co., Wilmington, Del.
A. Falkenau, Falkenau-Sinclair Mch. Co.
F. E. Dodge, Barrett Mfg. Co.
F. J. Wright, U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Wm. Wisner, R. S. Newbold & Son Co., Norristown, Pa.
Percy N. Snoeberger, B. F. Sturtevant Co.
Jno. Patton, North Wales Foundry Co., North Wales, Pa.
W. A. Heizmann, Penn Hardware Co., Reading, Pa.
Howard Evans, J. W. Paxson Co.

The St. Louis Model Foundry.

E. E. Brown, chairman of the committee on the project for equipping and operating a model foundry at the St. Louis Exposition, reported at length. His committee and the com-

mittee of the Pittsburg Foundrymen's Association had given the matter a good deal of attention, with the idea of formulating plans for consummating the project. The expense would have to be borne entirely by subscription or otherwise, and two plans to raise the necessary funds had been presented. The Pittsburg committee favored the plan of a general subscription by founders and supply and equipment people, while the committee of the Philadelphia association proposed that the expense be met by the sale of space in and outside of the foundry building for exhibits of supplies and equipment at the rate of $1.50 per square foot for inside space, and $1 per foot for outside space. This, with the returns from the sale of souvenir castings, it was thought, would meet expenses very nicely. The building, which would have to be erected specially, must be paid for out of the money raised, as the exposition authorities could not undertake to provide it. Plans for a suitable building had been prepared at the Worcester Polytechnic Institute, and were before the association for inspection. Dr. Holmes, who is in charge of the mines building, is arranging to send out a circular to every foundryman in the country asking for support on one or other of the plans suggested.

President Devlin called for the views of the members present on the matter, and after considerable discussion it was found that while all favored the exhibit, it was thought best to await the result of the circular appeal, and the matter was left in the hands of the committee for further action.

72-Hour and 48-Hour Coke.

The "Quiz Class" presented the question, "What is meant by 72-hour coke, and how can it be distinguished from other grades?" It was explained that the subject was suggested by a law suit now pending, a broker claiming that he supplied 72-hour coke, while the purchaser claims it was only 48-hour coke.

In reply to the chair Mr. Moore said he always considered 72-hour coke was coke burned that time and afterwards very carefully drawn and selected. Forty-eight-hour coke of course was a grade burned the lesser number of hours. Its appearance should be a sufficient guide to any man posted in his business to decide the difference between two samples of these cokes.

Mr. Davis.—If you should see both cokes, that other people sold, in two piles, could you pick out either?

Mr. Moore.—The 72-hour coke is certainly distinguishable. There are no nigger heads or other blemishes in it for one thing.

Mr. Matthews.—Of course 72-hour coke is best. I have seen 48-hour coke, though, just as good in structure as 72-hour coke.

Mr. Haldeman.—It is not a question in my mind as to how long coke is burned. Foundry coke should be properly burned, and as properly drawn and selected. It makes no difference how long it is burned. The quality depends very largely on the man who is in charge of the ovens and the handling of them. If the ovens should be hurried or forced your coke is not likely to be properly burned. If left in the ovens a long time the coke is apt to be better prepared. We have tried experiments on the quality of 72 and 48-hour coke and get equally good results in both cases. The chemical tests showed no difference either.

Mr. Davis.—As in other lines, the classification of coke seems to be imperfect. The term 72-hour coke seems to come from the fact that it covers coke left in the ovens over Sunday. Chemically or otherwise, I could not determine the difference between good samples of either kind. Personally, I should place little reliance on appearances.

The Chairman.—Does the quality of coke depend on the quality of the coal and the impurities it contains?

Mr. Haldeman.—Assuredly. But if you do not properly coke coal you cannot get good quality coke. You could not make as good coke out of bad coal as out of good. The thing you have to guard against is sulphur. If coke is not properly burned you will not get rid of the sulphur.

Mr. Hibbs.—Why will not all bituminous coal coke?

Mr. Haldeman.—The volatile matter in the coal affects it. It may be high enough in carbon but will not coke—too much water in it.

Mr. Roberts.—In my experience with coke I have found a light coke will melt iron in three-quarters of the time heavy coke will. Analyses of both show no difference.

Mr. Haldeman.—The lighter coke burns better because there are more cells in it. Coke may be light, yet solid, with large cells.

Another question, "What are the advantages of loam or dry sand castings over green sand, for certain work?" was then put forward.

Mr. Hibbs.—A dry sand mold is better for a casting required to be solid and turned up to true shape. Iron lies better against loam or dry sand than green sand, and there are less chances of blowing. The green sand is damp and forms gases in the mold. The question of making large castings in green sand has been thoroughly ventilated, but in my experience it is a great disadvantage to use green sand for work of this class.

Troubles with Iron and Coke Samples.

George C. Davis then presented the paper of the evening, on the subject, "Some Troubles with Samples of Iron and Coke." It is as follows:

So much has been written on the question of sampling, so many societies have prepared specifications to be followed in this class of work, that it would seem at first glance to be a pretty rash man who would endeavor to present anything new on the subject. There are several points in connection with the matter that, so far as I know, have not been covered and these I wish to bring to your attention.

During the past few years there has been a very large increase in the number of foundries who use analyses of their iron and coke. Some of these send their samples to public chemists, others depend on the laboratories of the furnaces from which they purchase iron, and still others belong to combinations having a centrally located laboratory. But in each case the samples have to be transported by mail or express. Many of the men in charge of manufacturing plants do not realize the importance of careful sampling, and even if they do their time is fully occupied with larger matters; so necessarily this work falls to someone else. Let us consider what frequently happens. The superintendent sends some handy man about the place to sample a car of pig iron. This worthy generally selects one pig (usually from the "make weight" pigs near the door). Sometimes if he is unusually careful two pigs are selected. These go to the machine shop, and the foreman, thinking anybody can drill a hole, sets the greenest apprentice at the job. The pigs are placed on a drill press in any position that happens to be easiest and the drill is started through the outside skin. The drillings that fall on the table are scraped up, plus more or less sand, cotton waste, brass, wood, or steel chip, and oil or whatever was on the drill table last. They are placed in a common gummed envelope and mailed. You will at once say I am describing an exaggerated case, but I can assure you that it is not so far different from actual practice as I would like to have it. Be this as it may, we have then three sources from which disputes may arise.

1st. A non-representative sample.

2nd. Contamination of the sample by sand, etc.

3rd. Poor packing, resulting in loss in transit and further contamination.

The first cause has been so thoroughly discussed by many authorities that it needs little comment here. Suffice it to say that I frequently receive one pig to represent large lots of iron, or one piece of coke as a carload sample sent in by people who are not novices in the iron trade. I do not refer to any one person but to a number.

The second is in my opinion one of the chief causes of disputes in foundry and malleable pigs. Other things being equal, the value of iron for any given use depends on its silicon contents. In the writer's own experience, which covers a number of foundries both large and small, I can say that the samples that contain absolutely no sand are in the small minority; the majority contains any amount up to 3 percent—the latter amount being not at all uncommon, and in a very few cases I have separated more than this—once as high as 12 percent. When we consider that some of the iron used in this region contains less than 1 percent silicon, and that a minute grain of sand weighing one milligram, if weighed with the silicon, would cause an error of nearly .05 percent,

we can readily see where many of the disputes arise. Anyone interested in mathematics can easily figure out the possible errors arising from the presence of sand. Some time ago I received a sample in the ordinary course of business which I found contained sand. My result was disputed and the remainder of the sample was sent to three chemists, one of whom (standing very high professionally) reported 1.74 percent silicon, which was the correct result. The other two reported 1.99 percent and 2.02 percent respectively. I have changed the figures a trifle so as to give no clews, but the proportion of error remains the same. While sand is the main source of contamination it sometimes happens that other foreign matter is present that affects the carbon determination. From a commercial point of view these are not so important, as carbon analyses are not often specified.

The third cause, bad packing, is responsible for much trouble. Drillings placed in an ordinary gummed envelope frequently lose graphite and the finer portion under the ends of the flap, which is not gummed, or else the rough handling and weight of the drillings unseals or breaks the envelope. Just to illustrate my meaning, I have received packages containing powdered coal and pig iron in loosely sealed envelopes. In this case a carbon analysis was wanted in the iron. In another, a package containing boxes of sand and pig iron, the boxes were loosely fitting pasteboard, such as are used to hold woodscrews. When the package arrived it was a case for an arbitration commission as to which originally contained the sand and which the iron. In another case some steel drillings covered with oil were placed in an envelope. The combined action of the oil and the sharp edges of the drillings had played havoc with the paper. I once received by mail a package containing a thin glass vial full of strong sulphuric acid and closed with a cork. It arrived safely. Another package contained a number of envelopes of iron drillings not sealed at all, and a separate analysis was wanted of each. In case of small samples of coke, I frequently get packages loosely wrapped, with the address written on a shipping tag. This usually tears in two or is torn off altogether. I get many such samples that have been patched up in the postoffice and, thanks to the care of the clerks, finally do arrive. Few people realize what rough treatment packages are subjected to in the mails. Much of it of course is unavoidable and merely results from the weight of the material itself. I trust if anyone recognizes his handiwork in the foregoing description of "how not to do it" he will take my criticism in good part.

Let us now consider the best way of avoiding the difficulties I have described. So far as concerns the first and second, many elaborate methods have been published. We can sum them up by saying they involve good judgment in selecting a fair sample and care in its preparation, drilling, grinding, or whatever the process may be. In sampling pig iron with a drill press, the pigs should stand on end and as the drillings are made they should be collected with a magnet. If the magnet is then held over an envelope or piece of paper, the drillings can be detached by a slight rap. Personally I prefer a small lathe for sampling, as it is much quicker in adjusting for different lengths of pigs than a drill press. If a piece of paper is held underneath the drill, but not quite in contact with the pig, a clean sample will be obtained, as a drill running at high speed will throw the drillings on to the paper. Either method requires two men to handle it easily. In case it is necessary to sample a lot of iron in place, there is a breast drill invented by Mr. P. W. Shimer, of Easton. It was described in Vol. XXX, page 321, of the Transactions of the American Institute of Mining Engineers. In some works portable air drills are in use for sampling.

We now come to the third cause involving the best method of packing, and I am free to confess that I have no method to suggest that can be considered perfect. Glass bottles and tin boxes are objectionable for several reasons. The former are fragile and not admitted to the mail unless encased, thus making a heavy package. The boxes are objectionable because gummed labels do not stick well to them, and the boxes soon rust in the laboratory air. There are a number of patented mailing envelopes and packages. Among these the Beecher envelope (samples of which I have here) seems to be the most widely used. I have been unable to get a complete list of these mailing envelopes. Whatever style is used, the paper should be of the best linen, as the cheaper grades are easily punctured. In case it is desired to send any moist substance, it can be packed in glass and enclosed in a metal box. The sample I have here, made by the Weaver Mailing Envelope & Box Co., weighs (including empty vial) nearly three ounces.

In conclusion I trust that all foundrymen will come to realize the importance of correct methods of sampling. Any system of mixing iron by analysis is based directly upon this, and unless it is well done, such a system, no matter how elaborate, is absolutely useless. At present I feel that the "state of the art" of sampling as practiced by the large majority is far from satisfactory.

Discussion.

In discussing the paper Mr. Haldeman said: "The two elements which give the most trouble in iron are sulphur and silica. The silica in every pig in every cast will vary and the sulphur will be lower at the top of the pig than at the bottom. It should therefore be understood that if a sample be taken from one pig only it will never be known what is being put into a cupola. Another thing, a mistake is sometimes made in taking the average sample of say 100 tons. Such an average does not help, as high sulphur iron may be used one week, and low the next.

Questions for Discussion.

Secretary Evans announced that the "Quiz Class" would present the following questions at the next meeting:

How many degrees Fahr. should an annealing oven show to anneal properly, and how long should material be placed therein?

Does it require more air and greater pressure of blower to melt high numbers of cast iron in a cupola for malleable purposes than it does for ordinary gray iron?

Does it take longer to melt hard white iron for malleable purposes than it does soft gray iron in a cupola of the same internal diameter?

What causes the change of carbon monoxide gas at the melting point in a cupola to carbon dioxide, above said melting point?

Does high silica facing resist the action of hot steel in steel castings to a greater extent than a high carbon facing?

Relative life of brass, galvanized and steel riddles?

Amount of moisture in sand when properly tempered for use?

Relative advantages of exhaust and non-exhaust tumbling barrels for different classes of work?

Are steel castings made by any of the "baby Bessemer" processes like the Tropenas, Robert, Bookwalter or Evans-Wills process better for certain purposes, than steel castings made by the crucible or open-hearth process?

Before adjournment a resolution was offered and passed endorsing John Birkinbine for appointment as a member of the Panama Canal Commission.

Post & McCord, Inc., is the name of a new company just organized in New York, to engage in the business of engineering and contracting for structural and ornamental work for buildings. The officers of the company are: William H. McCord, formerly vice president of the American Bridge Co., president; William C. Post, formerly contracting manager for the American Bridge Co., vice president and treasurer; Andrew J. Post, formerly chief engineer of the plant of the Empire Bridge Co., secretary and chief engineer. John C. McCord, formerly erecting superintendent for the American Bridge Co., of New York, in the metropolitan district, will have charge of the erection forces, and Robert C. Post, formerly contracting agent for the American Bridge Co., will have a similar position with the new company. The company's offices are in the Flat Iron building, New York City.

It has been announced in London that the amalgamation of the Weardale Steel, Coal & Coke Co. and the South Durham Iron & Steel Co., two of the most important concerns of the North of England steel trade, has been effected.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Blue Grass Stone & Iron Works, Lexington, Ky., has been incorporated with a capital of $12,500, to manufacture stoves and iron ware. The officers are: Charles Stanley, president; Perry Crosthwait, vice president; C. W. Foushee, treasurer; and O. W. Snyder, secretary.

The Lindsay Wire Weaving Co., Cleveland, has been incorporated with a capital of $50,000. The incorporators are: Hamilton Lindsay, Sterling Parks, Frank C. Scott, L. Cannon and Mark A. Copeland.

The Burke Machine Co., Cleveland, has been incorporated with a capital of $20,000. The incorporators are: Sophina Burke, Ervin A. Burke, G. H. Burke, J. H. Kuzel and A. A. Bemis.

The Crouse-Hinds Co., Syracuse, N. Y., has been incorporated with a capital of $450,000, to manufacture machinery. The incorporators are: H. B. Crouse, J. L. Hinds, D. F. Costello.

The Columbia Nut & Bolt Co., New York, has been incorporated with a capital of $50,000. The incorporators are: J. J. Donovan, T. H. Low and J. B. Henny.

The Attwood Chain Works have been incorporated at Lebanon, Pa. The incorporators are: Henry T. Atkins, George Holly and Robert Mellman.

The Hasbrouck Motor Works Co., West Mystic, Conn., has been incorporated with a capital of $75,000. The company has new shops at West Mystic.

Cedar Creek Mill Co., Brewton, Ala., is in market for about four miles of 40-pound new steel rails and three miles of 30-pound new steel rails.

Harper Machinery Co., Park Row building, New York, will buy three miles of 16 or 20-pound rail, one 36 or 42-inch gauge geared locomotive, suitable for wood rail, weight 8 to 12 tons; also a 36-inch gauge locomotive with 10-inch cylinder.

Hoff & Harris, Comanche, Tex., contemplate buying 100-h. p. high speed automatic engine for electric light plant.

Battey Machinery Co., Rome, Ga., is in the market for 80-h. p. tubular boiler and 75-h. p. plain slide-valve engine, both second-hand.

Reinecke Coal Mining Co., Madisonville, Ky., is in the market for a mechanical box-car loader.

The Roth Mfg. Co. has been organized at Columbus, Ind., with a capital of $50,000, to manufacture the Roth pitless pump.

The Stephen Ransom Co., New York, capital $10,000, has been incorporated to deal in machinery.

The Erie Shipbuilding Co., capitalized at $30,000, has been incorporated at Buffalo, and will engage in building and repairing ships of all kinds. The list of officers includes James McDougall; George A. Boland and Edward M. Dutnie.

The Roberts-Snyder Co., Columbus, O., capital $20,000, has been incorporated to make steel, cast iron and wooden machinery, by Richmond Hammond, Owen T. Snyder, Owen G. Roberts, Chas. H. Brown and John E. Phillips.

The Valentine Gas Engine Co., Westfield, N. J., capital $50,000, has been incorporated to manufacture gas engines. The incorporators are: Warren P. Valentine, Charles B. Dana, Frank Clary.

The Caloric King Furnace Co. has been incorporated in New York with a capital of $500,000. The company will manufacture appliances and devices for boilers. The incorporators are: Lewis B. White, Jersey City; Amos H. Mylan, Lancaster, Pa.; Thomas F. Fitzhugh, Brooklyn, N. Y.; Carlton G. Winans, Newark, N. J.; and John H. Winans, Brooklyn.

The Supervising Architect, Washington, D. C., will open bids Jan. 4 for the installation of two electric passenger elevators in the U. S. Appraiser's warehouse, New York City.

The American Cable Fence Co., Pekin, Ill., has been incorporated with a capital of $25,000.

Mayer Bros., Inc., is the name of a new incorporation in Mankato, Minn., whose business will be the manufacture of trip hammers, boilers, gasoline and steam engines, structural steel and iron, etc. The capital stock is $100,000. The officers are: Louis Mayer, president; H. F. Leonard, vice president; Lorenz L. Mayer, secretary and treasurer.

The Bessemer Iron Ore Co., Blacksburg, S. C., has been incorporated under New Jersey laws, with capitalization of $500,000.

Fires and Accidents:—

The plant of the Windsor Locks Machine Co., Windsor Locks, Conn., was damaged by fire Dec. 3 to the amount of $6,000.

The Hillsdale Screen Works, Hillsdale, Mich., were destroyed by fire Dec. 3, with a loss of $50,000; insurance $3,000. One hundred people are thrown out of employment.

The erection of a blast furnace on the Nova Scotia Steel Co.'s property at Sydney, C. B., will be delayed on account of a fire which destroyed the Canadian offices and shops of the Rarig Engineering Co., of Columbus, O. It will require a month or more to install a new plant.

The main building and an acid shed of the Baltimore Stamping & Enameling Co., Baltimore, was destroyed by fire a few days ago. The damage to building was $12,000, not fully covered by insurance, and to the machinery and other contents of building about $20,000, not fully covered by insurance. The company had been in operation about six weeks.

The F. F. Avery Automobile Co.'s plant, Columbus, O., was burned Dec. 5, entailing a loss of $60,000. Thirty automobiles were destroyed.

Fire destroyed the F. P. Smith Wire & Iron Works building, 36-52 Chester street, Chicago, Dec. 3, causing a loss estimated at $100,000. The heaviest loss was to machinery, which was destroyed by falling into the basement from the fourth floor.

New Construction:—

The new rolling mill of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., is nearly completed, and will be in operation by Jan. 1.

New York Central officials state that the construction of the new round house and machine shop in Dewitt, N. Y., will be commenced in the spring. The yards of Dewitt will be the largest in the United States, with two or three exceptions.

The power house to be erected at the League Island Navy Yard will be a one-story brick and steel building of fireproof construction, 104 x 106 feet. Bids are due to the chief of the bureau of yards and docks in Washington on Dec. 26.

The Rochester & Lake Ontario Water Co., Lake Ontario, near Charlotte Pier, N. Y., will build a one-story pumping station, 58 x 201 feet.

The plant of the Barrett Mfg. Co., Ensley, Ala., is nearly completed. Machinery will be installed at once. The product will be house roofing and the plant will give employment to about 150 men.

Iron was melted a few days ago for the first time at the new plant of the Hockensmith Wheel & Mine Car Co., Penn Station, Jeannette, Pa. In addition to its chief output, mine cars, a large variety of castings will be turned out. Two hundred men will be employed.

The Keystone Drop Forge Co., formerly of Twentieth and Clearfield streets, Philadelphia, is now completely installed in its new plant at Chester, Pa., which has been built with a view to increase production largely. It is equipped with modern machinery.

The American Brake Shoe & Foundry Co., Mahwah, N. Y., has decided to double the size of its plant before spring.

The Central Iron & Steel Co., Harrisburg, Pa., is making good progress on its open-hearth plant, and will probably be ready for operation in January. The foundations have been laid for other buildings.

The Lincoln Stove & Range Co., Fremont, O., is building a modern plant consisting of a foundry, 282 x 82 feet; additional mounting room, 70 x 70 feet, three stories; office, 44 x 33 feet; and warehouse, 40 x 200 feet. The foundry has a steel truss roof erected by the Garry Iron & Steel Co., Cleveland. The monitor is to be 30 feet wide and to run the full length of the building, which will be entirely covered with ribbed glass, thereby assuring a thoroughly lighted room. No expense has been spared to make the foundry complete. The buildings are to be of brick with stone trimmings, also stone founda-

tions, and when completed will give one of the most up-to-date exclusively steel range plants in the country. These buildings were necessary to enable the company to keep abreast with its orders. The company will present to the trade a new and complete line of steel ranges about Jan. 1.

The Ferracute Machine Works, Bridgeton, N. J., have decided to rebuild their plant destroyed by fire about two months ago. The company has been reorganized. Oberlin Smith has bought stock from his brother, Frederick F. Smith, and Dr. Jacob G. Streets and continues as the president of the company.

W. H. Insley, representing a firm of iron founders in Indianapolis, has been in Kansas City, Mo., recently, negotiating for the purchase of ground on which to build a plant for the manufacture of structural iron.

The Williams Drop Forging Co., Scranton, Pa., will build a plant which will cover a plot of ground 90 x 180 feet. Bids for the erection of the buildings have been asked for. The officers are: President, Alfred Harvey; secretary, W. J. Lewis. It is expected that the plant will be ready for operation early in the spring.

Sweet's Steel Co., Syracuse, N. Y., hopes to have its plant at Williamsport, Pa., now in process of construction, in full operation by April 1. The new plant will contain three open-hearth furnaces of fifteen tons capacity each, with cranes, gas producers, etc. It will also contain one 14-inch train of rolls, one 12-inch and two 9-inch trains, with heating furnaces, straightening beds, shears, etc. It will also contain three hammers of various sizes. The output of the plant will be the same as that of the company's present plant—open-hearth steel of special analysis to suit special requirements, and special shapes rolled from open-hearth steel and re-rolled from old steel rails. The Williamsport plant is located on 20 acres of ground, served by the Philadelphia & Reading railroad at its junction with the New York Central and by the Pennsylvania road. The plant will have ample railroad facilities and all appliances necessary for the handling of the class of material which the company produces.

The new foundry of the Gartland Foundry Co., Terre Haute, Ind., will be ready for operation by March 4. The company has been incorporated with a capital of $50,000.

The plant of the Iowa Malleable Iron Works, Fairfield, Ia., will be in operation about Feb. 1. It will turn out about 2,500 tons of malleable iron per year. The company is incorporated with $65,000 capital stock. The citizens of Fairfield gave a bonus of $75,000.

The Richmond Mfg. Co., Livermore Falls, Me., recently incorporated, will build a plant, 182 x 45 feet, two stories, and will employ 200 men. The capital is $50,000, of which $21,000 is paid in. The company expects to be in operation May 1, 1904.

Charles A. Gildemeyer has moved his foundry and machine business from Philadelphia to Minersville, Pa., where the citizens have subscribed $5,000 for the erection of buildings. A three-story machine shop, 75 x 90 feet, is to be erected this winter, and in the spring a foundry of the same dimensions will be built.

Charles Herman & Son have completed the building of a foundry at Sharpsburg, near Pittsburg, and are manufacturing pneumatic jarring molding machines.

The Walter A. Zelnicker Supply Co., St. Louis, Mo., will build a plant for the manufacture of hardware specialties, heavy hardware and repair engines and cars.

The Columbus Motor Car Co., Columbus, O., has closed a contract for 40 automobiles for Russia. The first shipment will be made in about two months.

The Barcalo Mfg. Co., Buffalo, N. Y., manufacturer of iron and brass bedsteads, will erect a one-story addition, 102 x 106 feet.

The Pittsburg and Valley Districts:

The Riverside plant of the National Tube Co., Wheeling, W. Va., will close down the first of the year for extensive repairs and improvements.

The Muskegon, Mich., plant of the American Tin Plate Co. is being dismantled and the mills will be shipped to South Sharon, Pa., where they will be installed in the 20-mill plant of the company at that place. The Muskegon plant contains six hot mills and five cold mills and has an annual capacity of 5,500 boxes. While it is reported that other mills will be removed to South Sharon, thus further centralizing the tin plate industry in the Shenango Valley, no active steps along this line have yet been taken.

The Bessemer plant of the Republic Iron & Steel Co., Youngstown, O., resumed operations this week and from present indications will continue to operate for some time. A number of the departments in the Brown-Bonnell plant of the Republic Co. resumed operations as well as the Valley plant at Youngstown. All of the mills of the American Steel Hoop Co., with the exception of the seven-inch continuous at Youngstown, have resumed, as well as the company's plant at Girard, O.

The plant of the Hubbard Shovel Co., Pittsburg, was destroyed by fire this week. Loss about $100,000. The plant was almost entirely destroyed. The company manufactured shovels and small mining tools.

The Pittsburg, Pa., office of F. R. Phillips & Sons Co., manufacturers of rolling mill machinery and dealers in iron, steel and coal, has been removed from 721 to 325 Park building.

General Industrial Notes:—

The Harrow Spring Co., Grand Rapids, Mich., was established in 1876. While it has a rolling mill and has always made spring steel, merchant bars and machinery steel, it has been kept very busy on large contracts for springs with the manufacturers of agricultural implements, also with car manufacturers for car springs. The company now proposes to put on an extra shift and push the spring steel, merchant bar and machinery steel outputs, though not to the exclusion of the other business. The officers are: J. K. Wagner, president; W. P. Burdick, treasurer and manager, and E. R. Burdick, secretary.

The ratepayers of St. Thomas, Ont., will be given an opportunity to bring the Pere Marquette railway shops to that city. An agreement has been made with the city council subject to ratification by the ratepayers, that the Pere Marquette will erect its Canadian shops at St. Thomas, at an estimated cost of $75,000, and will employ not less than 100 men. In return for this the city is to give the company a bonus of $20,000, exemption from all taxes, except school taxes, for 10 years, and will furnish water at manufacturers' rates of 6 cents per hundred cubic feet. All repairs for the 400 miles of road in Canada will be done at the new shops. The agreement calls for erection work to be commenced six months after the approval of the contract, and to be completed within nine months of April 1, 1904.

The Globe Machinery Co., Salt Lake City, Utah, recently incorporated, has purchased the assets of the Acme Mine Machinery Co. and is continuing the business at that company's old stand, making a specialty of handling new and second-hand mining machinery.

The Ellis & Lessig Iron Co., Pottstown, Pa., has resumed operations at its mill with a full force.

Schedules in the bankruptcy case of the Morse Iron Works & Dry Dock Co., Brooklyn, N. Y., show the liabilities to be $1,246,020 and the assets $1,494,730.

The Milwaukee Rice Machinery Co., Milwaukee, has been declared bankrupt. The assets are placed at $72,000 and the indebtedness $10,000 less.

The Smith, Myers & Schnier Co., Cincinnati, whose plant was recently visited by fire, informs us that all but the office and patterns were destroyed. The company has about half the regular force at work in another location, and will be back to its old place by Jan. 1, 1904, running full force.

The Dean-Waterman Co., Greenfield, Ind., has recently purchased the Trees Mfg. Co., of that city, and intends to push the sales of Hancock gas and gasoline engines. The Dean-Waterman Co., of Covington, Ky., is under the same management and will make all the castings for the Hancock engines. It is the intention of the management to move the Greenfield branch to Cincinnati as soon as the business can be organized on a modern basis. A thorough investigation of small gas engines was made and several authorities consulted before this company took up the Hancock gas engine.

The Standard Bolt & Nut Co., Alliance, O., has obtained an order from Spain, its first from a foreign land.